

ACADEMIC RESEARCH IS NECESSARY, BUT NOT SUFFICIENT

Investment in research can translate into national development only through pursuit of post-academic research

The Government of India is in the process of revisiting the Science, Technology and Innovation (STI) Policy. The policy will guide the agencies of the government mandated with funding research in higher education institutions and national laboratories. At this stage we need to ponder the question: what kind of research should be funded? That leads one to look at the nomenclature used by researchers for this purpose. Here it is pertinent to recall what William Shockley said in his Nobel lecture in 1956, that words like “pure, applied, unrestricted, fundamental, basic, academic, industrial, practical etc.” are being used frequently “in a derogatory sense, on the one hand to belittle practical objectives of producing something useful and, on the other hand, to brush off the possible long-range value of explorations into new areas where a useful outcome cannot be foreseen.”

Alternate frameworks:

Experts in science and technology studies have come up with alternate frameworks and terminology to provide a comprehensive picture and avoid any value judgement. One approach was proposed by NASA in the form of Technology Readiness Levels (TRL), a type of measurement system used to assess the maturity level of a particular technology. TRL-1 corresponds to observation of basic principles. Its result is publications. TRL-2 corresponds to formulation of technology at the level of concepts. Then the TRL framework advances to proof of concept, validation in a laboratory environment, followed by a relevant environment, and then to prototype demonstration, and ending with actual deployment. The framework uses terms as applicable to aerospace applications, but one can come up with alternate terms depending on the field of application, including health sciences where the term ‘translational research’ is commonly used. The number of levels can also be adjusted to suit the application.

An alternative is to use the terminology ‘Academic Research (AR)’, and ‘Post-Academic Research (PAR)’. One can easily establish correspondence with the TRL framework, with AR corresponding to TRL-1 and the rest to higher levels. To provide some granularity, one can divide PAR into early-stage PAR, and late-stage PAR. Late-stage PAR has to be done by large laboratories (national or those supported by industry), while AR and early-stage PAR can be done at higher education institutions and large laboratories.

Both AR and PAR generate knowledge which is necessary for national development. When examined from the perspective of national development, pursuit of AR alone, while necessary, is not sufficient. AR and PAR when pursued together and taken to their logical conclusion will result in a product or a process, or a better clinical practice, or a scientifically robust understanding of human health and disease, or provide inputs for a policy decision.

It is often said that India’s investment in research is lower than that by advanced countries. Here two observations need consideration. First, countries belonging to the Organisation for Economic Cooperation and Development (OECD) report research statistics according to the Frascati Manual, which was first drafted in 1963, and has gone through five revisions since then. We cannot compare data with other countries without having correspondence between India’s data and data reported by others. Second, India has to decide where to increase investment: in AR or in PAR. Investment in research can translate into national development only through pursuit of PAR.

This is not a call for abandoning AR, but a call to look for useful outcomes including via spin-offs and serendipity, and to prioritise research in areas that relate to national development.

During my talks with academics on this topic, some observed that our industry has not reached a stage where they can absorb research being done by higher education institutions. This observation reveals that research being pursued is either not addressing national needs or is limited to AR. The lukewarm response of industry is a message for academia to orient its priorities to

address national needs and engage in both AR and early-stage PAR and provide inputs necessary to raise the technology intensity of industry.

Pursuing AR and PAR:

One can cite several examples to illustrate how AR and PAR can be pursued together. A programme in high energy physics can be designed to pursue accelerator technology along with high energy physics. Research in electro-chemistry can be accompanied by development of battery technologies.

Judging the growth of S&T based only on publications provides an incomplete picture. Why is it that industries that have high technology intensity, such as aircraft and spacecraft, medical, precision and optical instruments, and communication equipment, have a low presence in India? What should be done to increase value addition to raw materials in India? The answer lies in increasing the technology intensity of industry, which was identified as one of the goals of the STI policy issued in 2013. This needs reiteration and a mechanism should be devised to monitor progress with the objective of becoming an 'Atmanirbhar Bharat'.

The STI policy should emphasise PAR to ensure that investment in research results in economic growth. To motivate the research community to pursue at least early-stage PAR, the reward system needs significant reorientation. The current system for rewards relies heavily on bibliometric indicators despite the knowledge that publications alone do not lead to national development. The reward system in higher education institutions and national laboratories should be reoriented to promote PAR. Academics in higher education institutions pursuing AR should pursue early-stage PAR themselves, or team up with those who are keen to pursue PAR.

In short, academic research is necessary, but not sufficient.

Meanings of Difficult Words:

- ❖ **Academic Research (AR)** (noun) – systematic investigation into a problem or situation, where the intention is to identify facts and/or opinions that will assist in solving the problem or dealing with the situation. Research in higher education institutions.
- ❖ **pursuit** (noun) – striving towards, push towards, aspiration/search for.
- ❖ **Post-academic Research (PAR)** (noun) – it describes research work/job outside university. Research in national laboratories.
- ❖ **Science, Technology and Innovation (STI) Policy (STIP)** (noun) – it is described as a form of decentralized, bottom-up, and inclusive design process aims to re-strategize priorities, sectoral focus, and methods of research and technology development for larger socio-economic welfare.
- ❖ **ponder** (verb) – think about, consider, review, reflect on.
- ❖ **nomenclature** (noun) – terms, a system of names used in particular field.
- ❖ **pertinent** (adjective) – relevant, appropriate, applicable.
- ❖ **derogatory** (adjective) – disparaging, belittling, disrespectful, discrediting.
- ❖ **belittle** (verb) – undervalue, denigrate, downgrade.
- ❖ **brush off** (phrasal verb) – rebuff, dismiss, reject.
- ❖ **exploration** (noun) – thorough examination, study, observation, investigation.
- ❖ **foresee** (verb) – anticipate, predict, envisage, envision.
- ❖ **come up with** (phrasal verb) – produce, put forward, present/submit.
- ❖ **comprehensive** (adjective) – all-inclusive, broad-based, complete/thorough.
- ❖ **Technology Readiness Level (TRL)** (noun) – a type of measurement system used to assess the maturity level of a particular technology.
- ❖ **correspond** (verb) – represent, denote, indicate.
- ❖ **prototype** (noun) – model, template, sample, pattern.
- ❖ **deployment** (noun) – the bringing of resources into effective action.
- ❖ **correspondence** (noun) – correlation, similarity, comparability.

- ❖ **Translational Research** (noun) – the process of applying knowledge from basic biology and clinical trials to techniques and tools that address critical medical needs. Unlike applied sciences, translational research is specifically designed to improve health outcomes.
- ❖ **granularity** (noun) – the state/quality of including a lot of small details.
- ❖ **pursue** (verb) – engage in, conduct, follow, carry on.
- ❖ **robust** (adjective) – strong, powerful.
- ❖ **call** (noun) – demand, appeal, need, necessity.
- ❖ **spin-off** (noun) – outcome, result, by-product.
- ❖ **serendipity** (noun) – chance, fluke, luck, happy accident, fortuity (accidental occurrence/ development).
- ❖ **academic** (noun) – scholar, lecturer/ professor, educator, instructor.
- ❖ **lukewarm** (adjective) – unenthusiastic, unresponsive, half-hearted, indifferent, dispassionate.
- ❖ **academia** (noun) – the community related to the education, research, etc.
- ❖ **illustrate** (verb) – explain, elucidate, clarify.
- ❖ **S&T Department** (noun) – The Department of Science & Technology plays a pivotal role in promotion of science & technology in the country.
- ❖ **reiteration** (noun) – the process of repeating something (some action) for clarity/ emphasis.
- ❖ **mechanism** (noun) – procedure, process, method/technique.
- ❖ **reorientation** (noun) – the act of changing the focus/direction.
- ❖ **bibliometric** (adjective) – relating to the use of statistical methods to analyse books, articles and other publications.
- ❖ **in short** (phrase) – briefly, in essence, in sum.

ALERT AMID UNCERTAINTY: ON RBI HOLDING INTEREST RATES

The RBI holds interest rates citing concerns about inflation outlook

The RBI has prudently decided to keep its powder dry for now, citing the “extreme uncertainty” that characterises the current outlook for inflation and economic activity. Observing that the “unprecedented shock” from the pandemic has left the economy stressed, the RBI said that while the monetary policy committee recognised the primacy of supporting a recovery, it was necessarily mindful of its inflation targeting mandate. The picture on prices is clouded by many uncertainties. While the provisional June CPI inflation reading of 6.1% had edged over the upper bound of the mandated medium-term goal of 4% plus/minus 2%, a spike in food prices as well as cost push pressures from higher transport fuel and raw material prices were combining to obscure the inflation outlook. Vowing to ensure that the policy stance remains ‘accommodative’ for as long as needed to revive growth, Governor Shaktikanta Das emphasised that the RBI was ready to act on rates once a durable reduction in inflation was sighted. For now, however, the projections remain less than encouraging. The latest round of households’ expectations of price gains in an RBI survey shows that consumers expect inflation to remain elevated in the near term — a finding that the RBI’s assessment broadly backs.

The prognosis on the economy is also worrisome. While the RBI expects the rural economy to turn in a robust recovery on the back of a strong showing by agriculture, a deterioration in consumer sentiment in the central bank’s July survey undermines the prospects for a more broadbased revival in domestic demand. Additionally, external demand faces headwinds from a world economy in recession and as global trade shrinks. Forecasting a contraction in real GDP in the current fiscal year, the RBI rather optimistically posits that an early containment of the pandemic may impart an upside surprise to its outlook. Interestingly, its analysis of the macro-economic environment skirts the potential challenges that heightened tensions with China, one of India’s largest trading partners and, in recent years, a source of inbound foreign capital, could pose to the economy. The central bank has therefore opted to focus its energies on trying to untangle the kinks hindering the flow of credit amid more than adequate liquidity, wary lenders and severely stressed

borrowers. The restructuring, resolution and enhanced gold loan proposals mooted by the RBI acknowledge the sheer scale of the pandemic's devastation on the finances of firms and households. The onus now is on Governor Das to ensure that the stability of the financial sector is safeguarded even as loan terms are reset to protect otherwise viable businesses. Any harm to financial stability risks undermining the economy as a whole.

Meanings of Difficult Words:

- ❖ **amid** (preposition) – in the middle of, surrounded by; during.
- ❖ **uncertainty** (noun) – unpredictability, unreliability, riskiness/precariousness.
- ❖ **hold** (verb) – continue, carry on, keep up.
- ❖ **inflation** (noun) – simply meaning “cost of living”; increase of price level of goods & services and vice versa decrease of currency value.
- ❖ **outlook** (noun) – prospects, expectations, forecast.
- ❖ **prudently** (adverb) – carefully, cautiously; sensibly.
- ❖ **keep one's powder dry** (phrase) – be prepared for an emergency.
- ❖ **characterise** (verb) – represent, describe, outline.
- ❖ **unprecedented** (adjective) – not done or experienced before.
- ❖ **shock** (noun) – disturbance causing volatility/uncertainty in an economy.
- ❖ **pandemic** (noun) – the worldwide spread of a new disease; The illness spreads around the world and typically affects a large number of people across a wide area.
- ❖ **stress** (verb) – pressurize, overstretch, burden, upset, distress.
- ❖ **The monetary policy committee (MPC)** (noun) – it is a six-member panel that is expected to bring “value and transparency” to rate-setting decisions. It will feature three members from the RBI – the Governor, a Deputy Governor and another official – and three independent members to be selected by the Government. The MPC will meet four times a year to decide on monetary policy by a majority vote.
- ❖ **primacy** (noun) – importance, priority, preference, first place.
- ❖ **mindful** (adjective) – aware of, conscious of, heedful of.
- ❖ **picture** (noun) – situation, condition, circumstances.
- ❖ **cloud** (verb) – spoil, ruin, wreck, mess up.
- ❖ **provisional** (adjective) – tentative, makeshift; transitional, temporary.
- ❖ **consumer price index (CPI)** (noun) – it is defined as the change in the prices of a basket of goods and services that are typically purchased by specific groups of households. To put it simply, it tracks the prices of goods and services purchased by consumers.
- ❖ **headline retail inflation** (noun) – it is a measure of the total inflation within an economy, including commodities such as food and energy prices. The CPI monitors retail prices at a certain level for a particular commodity. The change in the price index over a period of time is referred to as CPI-based inflation, or retail inflation.
- ❖ **core inflation** (noun) – it is a measure of the total inflation within an economy, excluding commodities such as food and energy prices (which change frequently).
- ❖ **edge** (over) (verb) – to increase by a small amount.
- ❖ **bound** (noun) – a limiting value.
- ❖ **spike** (noun) – a sharp increase.
- ❖ **cost push inflation** (noun) – cost-push inflation occurs when we experience rising prices due to higher costs of production and higher costs of raw materials.
- ❖ **vow** (verb) – affirm, pledge, promise/swear, make a commitment.
- ❖ **accommodative** (adjective) – cooperative, accommodating, helpful.
- ❖ **revive** (verb) – restore, revitalize, renew, bring back.
- ❖ **durable** (adjective) – long-lasting, strong, substantial.
- ❖ **sight** (verb) – notice, observe, spot, discern, detect.
- ❖ **household** (noun) – family, house.
- ❖ **elevated** (adjective) – high, raised.
- ❖ **broadly** (adverb) – generally, usually, commonly.

- ❖ **back** (verb) – support, endorse, approve, advocate.
- ❖ **prognosis** (noun) – forecast, prediction, projection.
- ❖ **worrisome** (adjective) – worrying, distressing/ upsetting, troublesome.
- ❖ **turn in** (phrasal verb) – achieve, reach, attain.
- ❖ **robust** (adjective) – strong, powerful.
- ❖ **on the back of** (phrase) – as a result of, after/subsequent, consequential, resultant; in support of.
- ❖ **deterioration** (noun) – breakdown, degradation, worsening, decline.
- ❖ **undermine** (verb) – reduce, diminish, spoil, damage, weaken.
- ❖ **prospects** (noun) – chances, possibilities, expectations, outlook.
- ❖ **broadbased** (adjective) – wide-ranging, general.
- ❖ **revival** (noun) – improvement, rallying, picking up, betterment.
- ❖ **headwinds** (noun) – (in business) situations or conditions that make growth harder/difficult. Whereas tailwinds describe a situation or condition that will move growth, revenues, or profits higher.
- ❖ **recession** (noun) – economic decline, downturn, slump.
- ❖ **shrink** (verb) – lessen, reduce, decrease.
- ❖ **forecast** (verb) – predict, foresee, estimate, foretell.
- ❖ **contraction** (noun) – In economics, it refers to a decline in national output as measured by gross domestic product.
- ❖ **Gross domestic product (GDP)** (noun) – a measure of economic activity in a country. It is the total value of a country's annual output of goods and service.
- ❖ **fiscal** (adjective) – financial.
- ❖ **rather** (adverb) – somewhat, a bit, slightly.
- ❖ **optimistically** (adverb) – hopefully, confidently, positively.
- ❖ **containment** (noun) – an act of keeping something (harmful) under control (it means quickly identifying cases of coronavirus through testing, placing infected individuals in isolation, tracking who infected persons might have been in contact with and potentially quarantining those who came into contact with infection so that the disease doesn't continue to spread).
- ❖ **posit** (verb) – put forward, set forth, present, propose.
- ❖ **impart** (verb) – pass on, transmit, spread, transfer, give.
- ❖ **upside** (noun as modifier) – positive, beneficial, advantageous.
- ❖ **macro-economic** (adjective) – relating to the branch of economics concerned with large-scale factors (interest rates/national productivity).
- ❖ **skirt** (verb) – avoid, evade, sidestep, dodge, circumvent, bypass.
- ❖ **heightened** (adjective) – increased, intensified, worsen, aggravated.
- ❖ **inbound foreign capital** (noun) – money entering the country as capital/investment from abroad.
- ❖ **pose** (verb) – raise, ask, put (a question/matter for consideration).
- ❖ **untangle** (verb) – find a solution to, resolve, clear up, clarify.
- ❖ **kink** (noun) – problem, difficulty, complication.
- ❖ **hinder** (verb) – obstruct, impede, inhibit, hamper.
- ❖ **credit flow** (noun) – availability of credit.
- ❖ **liquidity** (noun) – the availability of liquid assets; liquidity means liquid assets; cash; (liquid asset is an asset which can be easily sold/converted into cash without losing its value); a measure of activity (i.e. the ability to buy or sell easily) in a market.
- ❖ **wary** (adjective) – cautious, careful, circumspect, alert.
- ❖ **stressed** (adjective) – strained, overtaxed, pressurized.
- ❖ **moot** (verb) – propose, suggest, put forward.
- ❖ **sheer** (adjective) – utter, complete, total, absolute, outright.
- ❖ **devastation** (noun) – destruction, damage, havoc/wreckage.
- ❖ **onus** (noun) – responsibility, duty.
- ❖ **reset** (verb) – re-establish.
- ❖ **viable** (adjective) – manageable, feasible, effective.