TAKSHASHILA INSTITUTION

Takshashila Policy Advisory

Comments to the Parliamentary Standing Committee on Science and Technology, Environment, Forests and Climate Change on Demand for Grants (DFGs) in the Union Budget for FY 2021-22

V1.0, 15 February 2021

By Shambhavi Naik, Pradeep Mohandas, Sarthak Pradhan, Pranathi Rao, Aditya Ramanathan, and Pranay Kotasthane

Major Budgetary Trends

1) **The Government's R&D spending in concerned ministries and departments as a proportion of the total budget size has been declining**
    a) The budgetary allocation to R&D relative to the total budget of the Union Government has been on the decline except for the FY 2020-21 (Figure 1).
    b) For the calculation of total spending on R&D, the major heads that have been used are enumerated in Table 1 (Appendix).
    c) Some departments and ministries have clearly demarcated the spending of research and development. For example, the Department of Atomic Energy uses 2 different heads - Atomic Energy Research, Capital Outlay on Atomic Energy Research for the same. But it is difficult to delineate the same from the expenditure estimates of the Ministry of Environment Forest and Climate Change. **Better accounting classification would help analysis in the future.**
    d) **R&D spending needs to be prioritised**.

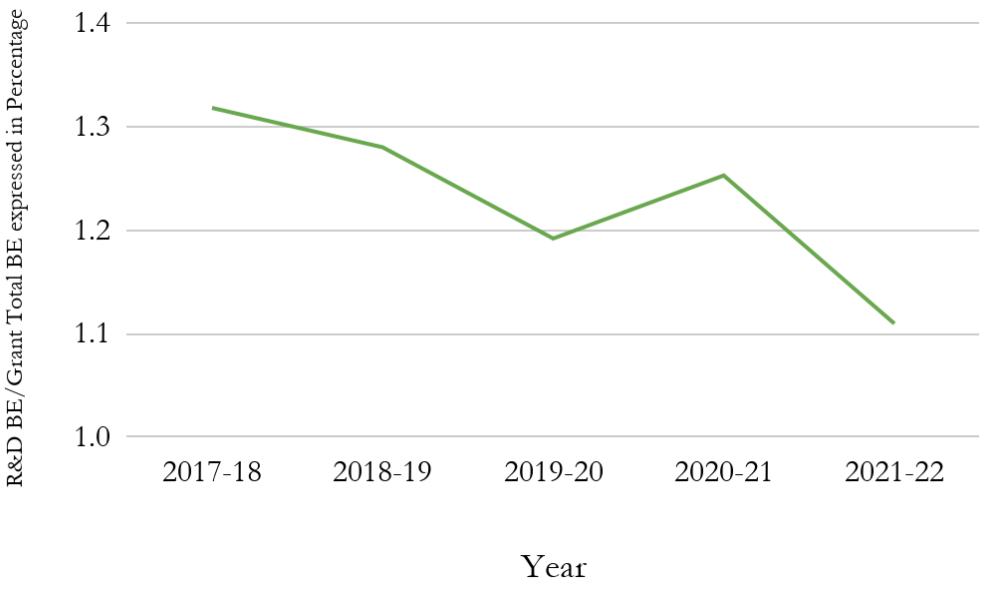

Figure 1: The ratio of R&D budget estimates to the grand total budget estimates expressed in Percentage

2) **The FY 2020-21 (Revised Estimates) of the concerned departments and ministries are lower than the FY 2020-21 (Budget Estimates).**
    a) For the FY 2020-21, the revised allocations for all the concerned departments and ministries have been lower. For the Ministry of Environment Forest and Climate Change, it was 35% lower (Figure 2).
    b) The pandemic could have been a reason for the reduction in revised estimates. **But this gap between revised estimates and budget estimates was observed even in FY 2019-20** (Figure 2).
    c) **Lower revised estimates can imply lower delivery as compared to the initial budgetary promise. Also, it can indicate weaker capacities to estimate requirements. The reason for this must be analysed further. and the demand for grants must be scrutinised considering the same.**

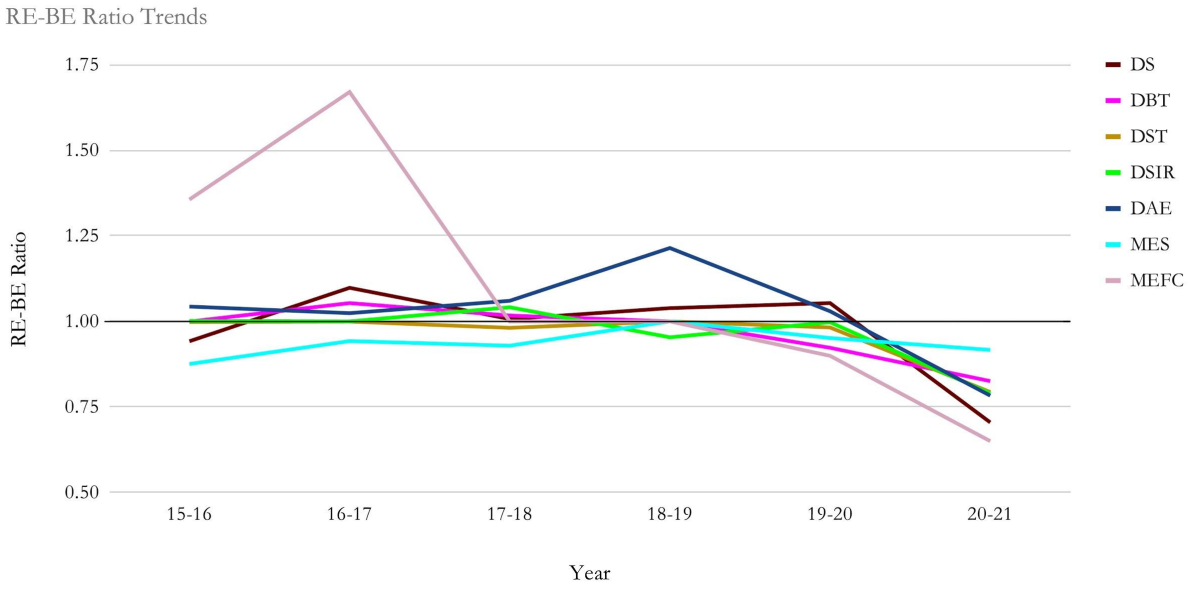

Figure 2: Revised Estimates (RE) to Budget Estimates (BE) ratio is <1 for most concerned departments and ministries for the second consecutive year

3) **Further, the Actuals are lower than the Revised Estimates for the past several years**
   a) **For FY 2019-20 and FY 2018-19, the actual expenditure of 5 out 7 concerned ministries/departments have been lower than the revised estimates. (Figure 3)**
   b) For the FY 2019-20, the actual expenditure of the Ministry of Earth Sciences and the Ministry of Environment Forest and Climate Change were 5.4 % and 4.45% lower than the revised estimates.
   c) It must also be noted that revised estimates tend to lower than budgetary estimates (Figure 2).
   d) **The reason for lower actual expenditures needs to be analysed and scrutinised while considering the demand for grants for the upcoming fiscal year.**

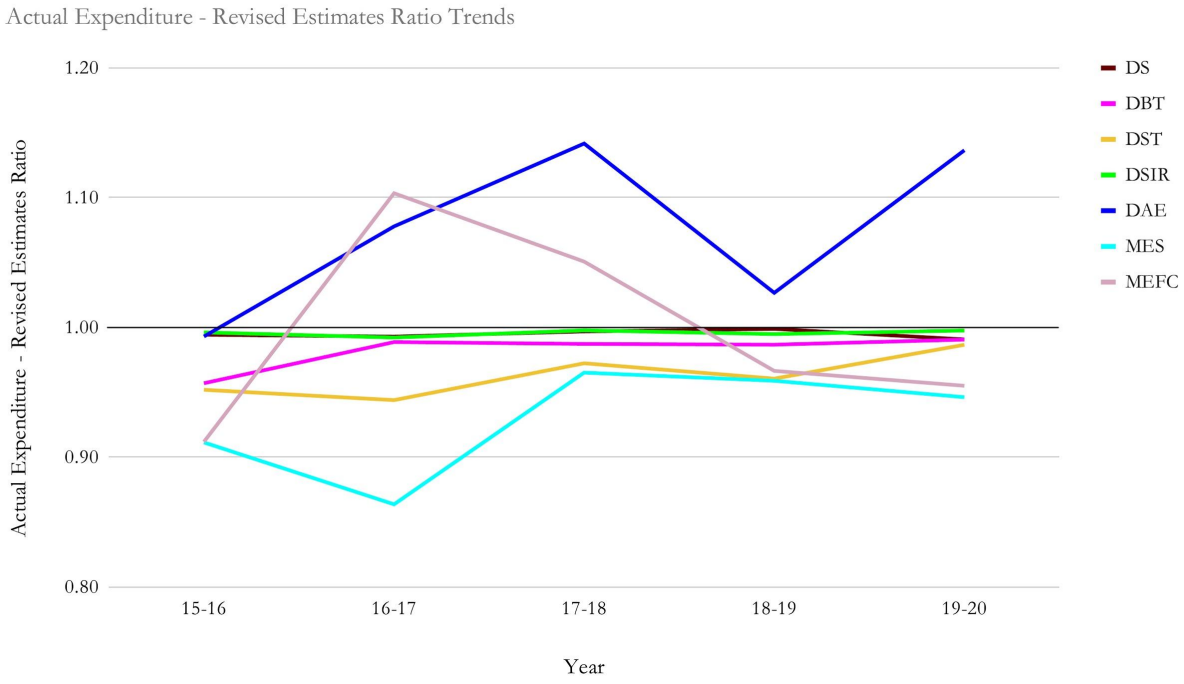

Figure 3: Actual Expenditure to Revised Estimates ratio

4) **Capital expenditure for many of the concerned departments and ministries have been minimal**
    a) The ratio of capital to revenue expenditure for 3 of the 7 departments/ministries has been lower than 1% (ratio < 0.01). Low capital expenditure might imply lesser focus on building laboratories, R&D infrastructure etc.
    b) The capital expenditure for the Department of Biotechnology as per the Union Budget documents is 0 for the last 10 years. This might be an accounting issue.

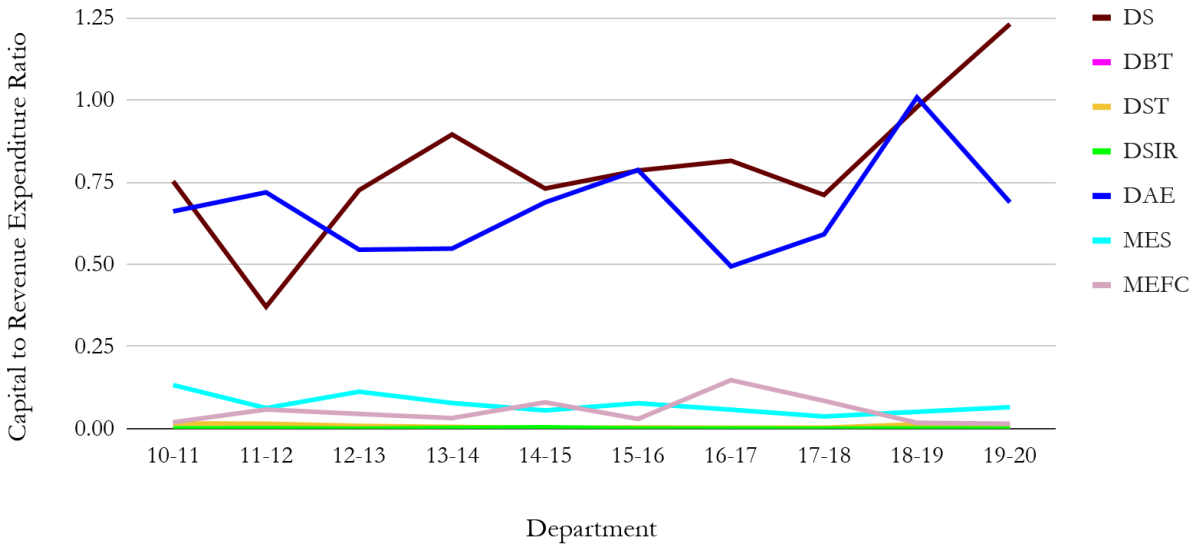

Figure 4: Ratio of Capital to Revenue Expenditure

5) **There has been a decline in the allocation to National Laboratories**
    a) The FY 2020-21 (RE) for National Laboratories (under Council of Scientific and Industrial Research) is 22% lower than FY 2020-21 (BE).
    b) The FY 2021-22 (BE) for National Laboratories is 5.1% lower than FY 2020-21 (BE).
    c) This decrease in allocation needs to be analysed.

Demand for Grants (2021-22) for the Department of Space

1) Space Technology:
    a) The Finance Minister has announced the launch of Chandrayaan III in 2021 in her budget speech. However, the outcome budget shows that we are aiming for six launches in total (two PSLV, one GSLV Mk II, two SSLV and one Gaganyaan Test Vehicle). **This does not provide for the launch of Chandrayaan III, which requires a GSLV Mk III. In fact, DoS has indicated zero launches for the GSLV Mk-III.**
    b) **India must aim for 10 launches (inclusive of PSLV, GSLV Mk II and GSLV Mk III) per year at the minimum to meet national requirements in communications, remote sensing and navigation satellites**. Facility enhancements were done at SDSC-SHAR in 2019-20 to enable ISRO to target 10 launches per year. ISRO should identify roadblocks that are stopping it from achieving the launch rate of 10 launch vehicles per year. Budgetary allocations for this critical function must be increased if required.
    c) The outcome budget also states a 36% completion rate of human spaceflight systems with one Test launch vehicle. News reports suggest that the second flight is expected from 2022-23. The Standing Committee had suggested an increase in the demand for the budget last year. **It needs to be ensured that budgetary constraints are not causing delays in the Gaganyaan mission. The Indian Data Relay Satellite System (IDRSS) needs to be launched and tested at the earliest, since the human spaceflight programme will depend on it for near-full time connectivity with mission control.**
    d) DoS needs to be congratulated for an income of ₹129.35 crores for providing launch services, as mentioned in the outcome budget. **ISRO should work with NewSpace India Limited (NSIL) on the commercialisation of GSLV Mk II and GSLV Mk III as the communication satellite launch market is financially lucrative.**

2) Space Applications: DoS deserves praise for an income of ₹11 crores for providing remote sensing services, as mentioned in the outcome budget. India needs more remote sensing satellites for defence and commercial applications. Hence it is concerning to note the reduction in the demand for grants from ₹1810 crores in FY 2020-21 (BE) to ₹1,476 crores in FY 2021-22 (BE) with a reduction in capital outlay.

3) INSAT Satellite Systems: The allocation has been reduced from ₹750.50 crores in FY 2020-21 (BE) to ₹329.61 crores in FY 2021-22 (BE). With the GSLV Mk-III becoming available for launch, communication systems need to be prioritised for commercial and defence needs. **Higher allocation should be given to clear the backlog of satellites to be**

launched and to launch more satellites for defence purposes and to ensure some redundancy in communications systems.

4) Physics Research Lab: PRL is a premier planetary research lab of the country. The budget for the PRL has been reduced year on year from ₹185.70 crores FY 2019-20 (Actuals) to ₹172 crores FY 2020-21 (BE) to ₹158.50 crores FY 2021-22 (BE). India is currently launching one interplanetary mission every ten years (eg. Chandrayaan 1 in 2008 and Chandrayaan 2 in 2019, Mangalyaan 1 in 2013 and Mangalyaan 2 - proposed in 2024). Indian planetary scientists from PRL would benefit immensely from participation not only in Indian missions but also in foreign missions. The low science output from Mangalyaan 1 is a matter of concern. PRL would be able to lead the way in changing this perception in terms of scientific output expected from an interplanetary mission.

5) New Space India Limited: The decision to provide budget support of ₹700 crores for NSIL is a welcome move. As stated under the Space Technology section, NSIL should also consider commercialisation of GSLV Mk II and GSLV Mk III.

Demand for Grants (2021-22) for the Department of Biotechnology

1) Targeted capacity building: DBT institutions contributed significantly to India's COVID-19 testing capacity. For future pandemic preparedness, upgrading of these institutions to address gaps in BSL3/4 capabilities is essential. **This upgraded infrastructure can contribute to both diagnostics and research on new pathogens. A clear, demarcated budget allocation for this upgradation needs to be included in the demand for grant.**

2) Ramp up capacity of DNA profiling: The Committee has recently tabled its report (Report no 340) on the DNA Technology (Use and Application) Regulation Bill, 2019. DBT has noted in this report that India's current capacity for DNA profiling is limited. [Point 2.2.1: DNA testing is currently being done on an extremely limited scale in India, with approximately 30-40 DNA Experts in 15-18 laboratories undertaking less than 3000 cases per year, which represent 2-3% of the total need.] **If the Bill is passed in 2021, there will be an urgent requirement to ramp up the capacity of profiling to prevent stalling of judicial cases dependent on this forensic evidence. Hence, DBT should consider an increase in this capacity as a key output for 2021.**

3) **Make demand for grants more detailed**: The DBT demand for grants contains only 2 sub-heads under Central Sector Schemes/ Projects - Biotechnology Research and Development, and Industrial and Entrepreneurship Development. Further details on grant requirements in alignment with the various outputs indicated in the Outcome Budget would be helpful. The Outcome budget also includes indicators for these two heads accounting for ₹2620.28 crores. The additional ₹846.91 crore being asked for in the demand for grant is not reflected in the Outcome budget. The outcomes and outputs should be recalibrated based on complete DBT funding as assistance to autonomous institutions and Biotechnology Industry Research Assistance Council (BIRAC) will contribute to achieving them.

4) Over past reports, DBT has not categorised capital and revenue expenditure separately: Unlike other departments, DBT has not provided capital expenditure for the last 5-6 years, despite investing in capacity building. Building new institutions is key to India's progress in science and technology - and the addition of bioparks and infrastructure is expected. However, a better understanding of capital and recurring expenditure would help in understanding spend on new infrastructure and actual research. The Outcome Budget also speaks about creating new bioparks, but does not specify the amount that will be spent on this.

Department for Scientific & Industrial Research

1) DSIR allocation for national laboratories has decreased: DSIR laboratories have been important in India's response to COVID-19 outbreak. The Budgetary estimates for National Laboratories for the FY 2021-22 are 5.1% lower than the budgetary estimates for the FY 2020-21. **India needs to build capacity in research and development and hence, this decreased allocation is surprising.**

2) Delayed salaries: A common thread in all the S&T departments is the delay in payment to scientific staff including PhD students and postdocs supported by these departments. The plight of students receiving stipends from Council for Scientific & Industrial Research (under DSIR) has been highlighted here. A central mechanism needs to be developed to disburse money in a timely manner.

National Research Foundation

Insufficient allocation for the promised National Research Foundation (NRF). In the Budget speech (Point 126), the Finance Minister had spoken about an outlay of ₹50,000 crores over 5 years for the National Research Foundation (NRF). To this end, the proposed budget through Demand Grant 49 requests an increase in budget for the Principal Scientific Advisor's Office from ₹56.00 crore in FY 2020-21 to ₹580.72 crore in FY 2021-22. The provision is for meeting the administrative expenses of the Office of Principal Scientific Advisor and NRF. As per point 14.5 of the NRF proposal, the total administrative cost (including infrastructure and salaries) will be less than 1% of the total budget of the NRF. The increase in PSA budget may reflect the administrative costs, but it is unclear how much money has been allocated for the various schemes under NRF and how this will be disbursed.

Appendix

Table 1 - Research and Development Budget Estimates. All figures are in Crores

Departments/ Ministries	Heads	2021-22	2020-21	2019-20	2018-19	2017-18
DAE	Atomic Energy Research	7183.44	6973.78	6064	5712	5247
	Capital Outlay on Atomic Energy Research	2040.81	2178.88	1939	1603	1859.91
MES	Oceanographic Research	658.9	812.8	726	716	576.6
	Other Scientific Research	72.8	98.2	100.5	82	52.6
	Capital Outlay on Oceanographic Research	15	17	18	15	16
MoEFCC	Capital Outlay on Other Scientific and Environmental Research	89	118	30	55	26.7
	Autonomous Bodies	305	340	324.9	301	244.8
DST	Other Scientific Research	5851	6108	5142	4963	4718.53
	Capital outlay on Other Scientific and Environmental Research	122	101	90	67.5	11.59
	Loans for other Scientific Research	0	0	0	0	4
DBT	Other Scientific Research	3205	2560	2372	2219.29	2046.75
DSIR	Other Scientific Research	5185	5361	4873	4772.71	4425.56
	Capital Outlay on Other Scientific and Environmental Research	0.5	0.5	0.5	0.5	0.5
	Loans for other Scientific Research	1.65	4	4	5	5
DoS	Space Research	5693	5668	5839	5466	4908.82
	Capital Outlay on Space Research	8228	7775	5663	5287	4155.38