Evaluation of Government Efforts for Women in S&T

A concise version of a detailed report titled "Initiatives for Empowering Women in Science & Technology: A critical evaluation"

July 2024

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PROJECT INFORMATION

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Disclaimer:
Although the central part of the report is based on primary data analysis, a few sections are partially based on secondary data and information from related sources like reports, research papers, and books. Documents from various ministries/departments, organisations, and websites have also been used. Due to the internet's dynamic nature, free and publicly available resources may subsequently change and become restricted; likewise, the location of items may change as menus and web pages are re-organised. While we have sincerely tried to refer to all these sources, we may have missed some.

Women in S&T

Women in S&T have been a much-discussed issue in the scientific fraternity, especially regarding economy, innovation, development, etc. However, women are still underrepresented in this field even when India has the highest number of women graduating from STEM worldwide. The United Nations has proactively discussed gender parity and highlighted it through its Sustainable Development Goals. India has also been following it up by taking various measures so that women are acknowledged and given their deserved rights in every sphere, especially in S&T. Still, there is a long way to go and as per various studies, India would take several decades to bring gender parity in STEM. With apt measures, this period can be narrowed down.

It has been argued quite often that Women in STEM face numerous challenges, frequently juggling personal and professional responsibilities while steering discriminatory policies and gender-blind structures. These hurdles hinder equal participation and retention of Women in STEM occupations. Addressing these obstacles is essential to achieving Sustainable Development Goals 5, 8 & 10 on gender equality and ensuring women's contribution to Science and Technology.

The Study

Our earlier study, "Women in STEM: A CSIR Survey towards Gender Parity", discussed the meager depiction of women in leadership roles in CSIR. The report also made several policy recommendations to address the issue. In the present project, broader trends and initiatives in Government organisations in the country were studied. These include the Department of Science and Technology (DST), the Department of Biotechnology (DBT), and the Department of Scientific and Industrial Research (DSIR). An attempt has been made to consider practices that enhance the contribution and empowerment of women in STEM. Thus the objectives of the study were to:

1. Examine and assess the Government initiatives to promote gender parity and women's encouragement in STEM fields.
2. Gender auditing of S&T manpower in Select S&T institutions in the country.
3. Gender-wise audit of the research grants in these organizations
4. Comparative analysis of #2 and #3 with CSIR (based on an earlier study conducted by the authors at the CSIR level).

Here we present a concise version of the report titled "Initiatives for Empowering Women in Science & Technology: A Critical Evaluation".

The Methodology: A secondary data collection followed a primary survey.

- The secondary data focused mainly on the collection of information that has helped examine and evaluate the Government initiatives to promote gender parity and women's encouragement in STEM fields.
- Funding of projects by DST and DBT was evaluated for the amount of funds and the number of projects gender-wise. The INSPIRE programmes were evaluated gender-wise to observe the trends in the last few years. The student STEM enrolments gender-wise in S&T fields were studied from the AISHE data.
- Data was procured for Gender auditing in the select S&T ministries and allied institutions. The emails were also collected which helped post questionnaires for primary data collection. Gender-wise audits of the research grants of these ministries were also carried out.
- The primary survey data was gathered through two types of questionnaires, one addressed to women S&T of these organisations, and the second addressed to the heads of divisions in ministries and the autonomous institutes (i.e. Directors).
- The first questionnaire was designed to collate their experiences in professions and personal lives. The

questionnaire aimed to evaluate individual perceptions regarding gender equality within their institutions and their awareness and utilisation of governmental schemes designed to encourage women in STEM among other parameters.

- The second questionnaire gathered insights on the perspectives and practices concerning gender-specific policies and initiatives from the Heads & Directors. It sought to identify potential gender-specific obstacles that might impede the productivity of divisions or organisations and aimed to gather suggestions for fostering a more women-friendly environment within these scientific institutions.
- The primary objective of the questionnaires was to identify any shortcomings or loopholes in the current work environment that might hinder women's advancement and to derive policy recommendations for narrowing gender gap.
- To evaluate the effectiveness of women's empowerment initiatives in STEM fields, semi-structured interviews were also conducted with officials directly involved in specialised GoI schemes.
- A comparative analysis was carried out between the present study and the previous study (of CSIR) to understand the differences and similarities of issues and challenges that women face in S&T including the policies implemented by these organisations. This has been helpful in the recommending policy measures for bridging the gender gap in S&T.

Findings: Secondary data

Government of India Initiatives

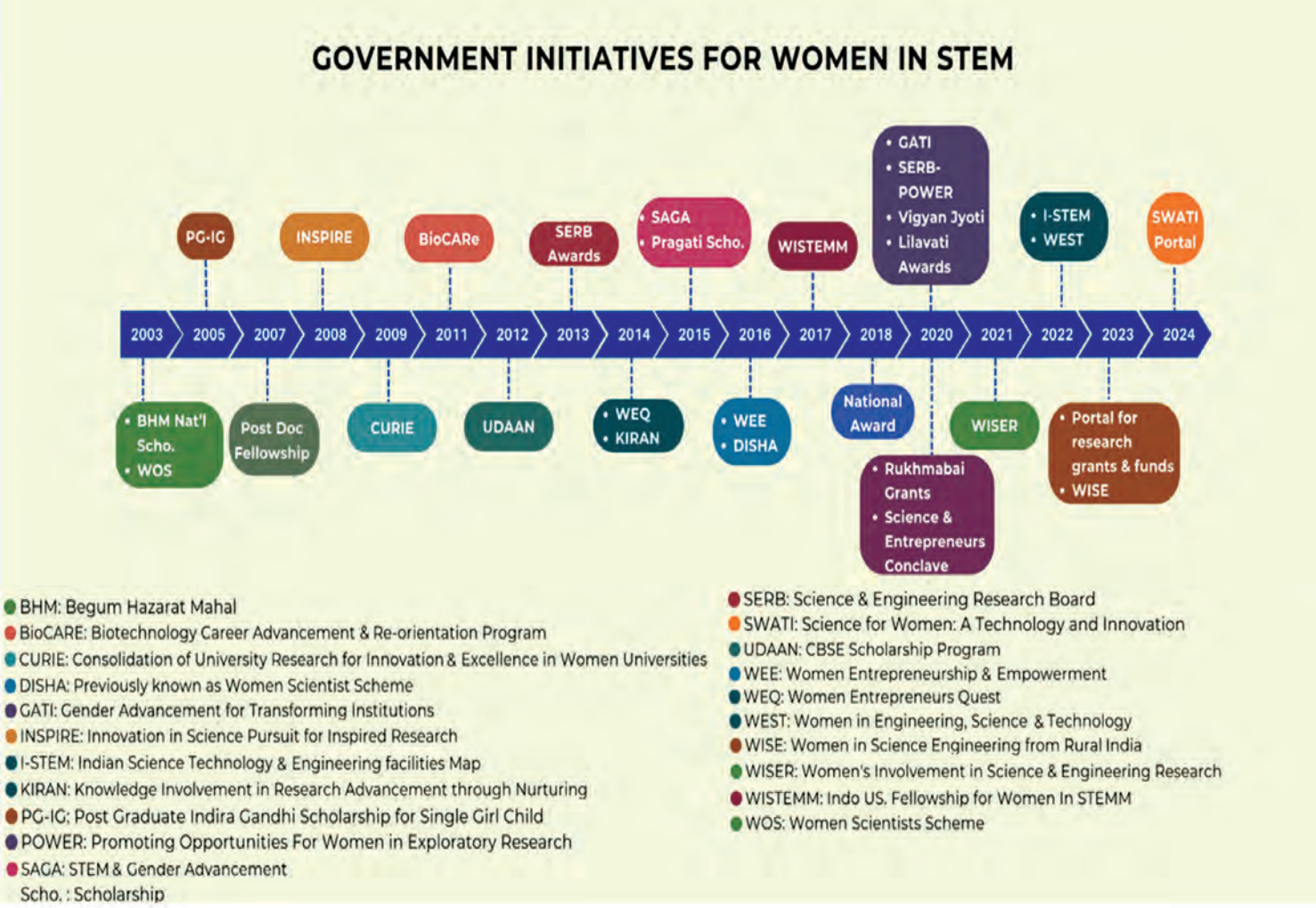


Figure: Initiatives for Women in STEM by government

DST Initiatives:

Programmes

1. Sophisticated Analytical & Technical Help Institute (SATHI)
2. Synergistic Training Program Utilising the Scientific and Technological Infrastructure (STUTI)
3. State Science & Technology Programme (SSTP)
4. Patent Facilitation Programme
5. Policy Research Programme (PRP)
6. India-ASEAN S&T Cooperation Program
7. NIDHI-EIR Program
8. Women Entrepreneurship Development Programme (WEDP)

9. Vigyan Jyoti Program
10. Bilateral Research Projects and Programs
11. National Mission on Nano Science & Nano Technology
12. Innovation and Entrepreneurship Training Programme
13. DISHA Programme

Initiatives

1. Strengthening, Upscaling & Nurturing Local Innovations for Livelihood (SUNIL) Programme:
2. Technology Interventions for Disabled and Elderly (TIDE)
3. Scheme for Young Scientists and Technologists (SYST)
4. Scheduled Caste Sub Plan (SCSP) and Tribal Sub Plan (TSP)
5. Science and Technology for Women (S&T for Women)
6. Scientific Utilisation through Research Augmentation-Prime Products from Indigenous Cow
7. Community Resilience Resource Centre (CRRC)
8. COVID19 Pandemic Related Activities
9. Science & Society Setu for Atma Nirbhar Bharat ($S^3$4ANB)
10. NEEV@75 programme
11. Women in Engineering, Science & Technology (WEST)

Women-Related Initiatives

1. Women Technology Park (WTP)
2. KIRAN (Knowledge Involvement in Research Advancement through Nurturing)
3. Vigyan Jyoti Programme
4. Women Scientist Scheme (WOS)
5. WISTEMM (Women in STEM)
6. Science and Technology for Women Empowerment
7. SERB Women Excellence Award
8. DST-CEFIPRA Women Post-Doctoral Fellowship
9. Women Entrepreneurship Development Programme (WEDP)
10. Indo-U.S. Fellowship for Women in STEMM
11. WEQ (Women Entrepreneurs Quest)
12. Women Scientists and Entrepreneurs' Conclave

Fellowships

1. DST-STI Policy Fellowship Programme
2. Cognitive Science Research Initiative (CSRI)
3. Science and Technology of Yoga and Meditation (SATYAM)
4. Innovation in Science Pursuit for Inspired Research (INSPIRE)
5. INSPIRE Awards – MANAK
6. Swarna Jayanti Fellowships Scheme
7. Indo-US Fellowship for Women in STEMM (WISTEMM)
8. Summer Research Fellowship
9. Visiting Fellowship program (VFP):
10. India Science Research Fellowship (ISRF)
11. SERB Fellowship

Fellowships under SERB:

1. National Postdoctoral Fellowship (NPDF) of SERB
2. SERB POWER Fellowship
3. JC BOSE Fellowship
4. Ramanujan Fellowship
5. Abdul Kalam TIN fellowship
6. Start up Research Grant Flagship Programme

SCHEMES FOR WOMEN

1. S&T for Women Scheme
2. CURIE (Consolidation of University Research for Innovation & Excellence in Women Universities)
3. Women Scientist Scheme
4. WISE-KIRAN (Women in Science and Engineering-KIRAN)
5. GATI (Gender Advancement for Transforming Institutions)
6. Mobility Scheme under KIRAN

Funding Schemes:

1. Women Scientist Scheme by DST
2. Post-Doctoral Fellowship for Women
3. Indo-U.S. Fellowship for Women in STEMM
4. National Post-Doctoral Fellowship

Scholarships:

L'Oréal India For Young Women in Science Scholarships

Awards and Recognitions:

1. National Women Bioscientist Award
2. SERB Women Excellence Award
3. Women in Science lectures by EMBO
4. Stree Shakti Science Samman Award
5. Indian National Science Academy (INSA) Fellowships
6. Indian National Academy Of Engineering (INAE) Awards
7. National Academy Of Sciences (NASI) - DST Awards
8. TWAS, The Academy Of Sciences for The Developing World - CSIR Awards
9. CSIR Award For S&T Innovations for Rural Development.

DBT Initiatives:

PROGRAMMES

1. Women Scheme DBT:
2. Knowledge Generation, Discovery Research, New Tools and Technologies
3. Building International Cooperation and Partnership
4. Biotechnology Industry Research Assistance Council (BIRAC)

Biotech Based Programmes for Societal Development:

- Biotech KISAN Programme
- Programmes for North Eastern Region (NER)

- Science Setu Programme
- DBT-HRD programmes

Training Programmes:

- Skill Vigyan State Science and Technology Partnership Programme in Life Science and Biotechnology: Hands-on training in biotech and allied areas.
- Biotech Industrial Training Programme (BITP): Six-month hands-on training for fresh Biotech graduates.
- Foldscope Programme: Training workshops on the use of Foldscope.

Outreach Programme:

- Genome editing/engineering and nanotechnology applications in Agriculture
- Animal Biotechnology Programme
- Mycobacterial Diseases in Animals network (MyDAN) Programme
- Aquaculture & Marine Biotechnology Programme
- Indo-U.S. Vaccine Action Programme (VAP)
- Human Immunology Programme

Domestic Fellowships:

1. DBT-Junior Research Fellowship (JRF)
2. DBT-Research Associate (RA) Fellowship
3. Janaki Ammal Fellowship
4. Tata Innovation Fellowship
5. DBT Ramalingaswami Re-entry Fellowship (DBT-RRF)
6. MK Bhan Young Researchers Fellowship
7. Distinguished Biotechnology Research Professorship
8. S.Ramachandran-National Bioscience Fellowship for Career Development
9. Har Gobind Khorana - Innovative Young Biotechnologist Fellowship (IYBF)

International Fellowships:

1. Khorana Fellowship
2. TWAS Fellowship
3. IITB-Monash Fellowship

Women Related Programmes

1. Biotech-KISAN program.
2. The Biotech KISAN Mission Program.
3. The Women Scientist Scheme.
4. Biotechnology-based programs.
5. Establishment of Women Biotech Park.
6. Support for women-led start-ups.
7. DBT-funded study in Mizoram.
8. Socio-Economic Empowerment of Rural Women
9. Hands-on training programs.
10. DBT-funded project on Gujjar and Bakarwal women empowerment.
11. Innovations in Rice Farming Technologies initiative.
12. Sericulture projects.

13. Pig farming.
14. Collaboration with ALEAP

Women-Related initiatives

1. GARBH-Ini
2. BioNEST
3. National Women Bioscientist Award
4. BioCARe
5. UMMID Initiative

Gender representations

- **Headships:** From the inception of DST till date, there have been 17 secretaries of the Department, of which only one was a female, a secretary of DBT with an additional charge of DST for a few months only. Of the nine secretaries of DBT, two have been women. For DSIR, the current secretary holding office is the first woman to hold the position.
- Out of seventeen DST institutes, only two are headed by women currently, while in DBT, sixteen institutes, only three are headed by women.
- The heads of divisions in the ministries, however, have a positive side. More than half of the divisions in both DST and DBT are headed by women.
- **S&T workforce:** At the ministerial level, it is observed that DBT has a good gender parity Index with a 42% female workforce in S&T, while DST has about one–third of women in the S&T workforce. At the institutional level, DST autonomous institutes have an average of about 20% female representation, while DBT has a higher percentage of women S&T (Eleven out of sixteen DBT institutes have female scientific representation above the national average of 18.6%). Geographically, the institutes in the country's southern region have a better female representation in S&T.
- In more than half of the DST institutes, (9 of 17) exceeded the national average of 18.6% in terms of women's representation in STEM and only eight institutes were below the national average.
- About one-third of the institutes affiliated with DBT (5 of 16) were below the national average of women scientists. Eleven out of sixteen institutes have female scientific representation above the national average of 18.6%.
- It is observed that NRDC has a better women representation in the scientific cadre, while CEL shows a substantial gender disparity.
- DBT has a slightly higher percentage of females than DST and DSIR, whereas DSIR institutes exhibit the lowest female representation (17%), signaling a significant gender disparity compared to the national average.

Funding patterns of DST and DBT projects:

- ❖ Funding of projects by both DST and DBT depicts gender imbalance in the PIs, with male PIs outnumbering their female counterparts by a more than 3:1 ratio.
- ❖ Over the years, the percentage of fund allocation to male PIs by DST has been higher than that by DBT.
- ❖ The number of projects funded by DST from 2018-19 to 2020-21 has declined. Also, the % female PIs in the projects during this period has gone down from 28 to 20% only. Likewise, the funding to female PIs during this period has also been reduced from 25% to 17%.

- ❖ The number of projects funded by DBT from 2019-20 to 2023-24* has reduced considerably, although the % female PIs in the projects during this period has been somewhat constant between 22-24%. The funding amount to female PIs during this period has also been between 19 to 26%.
- ❖ Under the INSPIRE Scheme, females receiving INSPIRE Fellowships are about two-thirds over the past few years, indicating a positive step toward achieving gender parity in the coming years. However, faculty fellowships have been relatively low, but data for the past two years show a rising trend.

Student enrolment:

- The female student enrollment in STEM fields has demonstrated a consistent upward trend.
- Starting at 49.01% in 2016-17, the percentage of female students pursuing Science has steadily increased, reaching 53.11% in 2020-21.
- Despite incremental increases, the growth rate in female enrollment in engineering has been modest over the five years. In 2016-17, female enrollment stood at 28.9%, experiencing a slight increase before reaching 29.26% in 2020-21.
- Female enrollment in science in 2020-21 was 53.11%, and the number in engineering and technology fields was 29.26%. These trends suggest that more young women are interested in pursuing education in science and engineering.

Findings of Primary Survey:

- ✓ The primary survey was done through the 1st questionnaire targeted at women S&T which had a good response rate of above 55% from DST, DBT, and DSIR institutes.
- ✓ The 2nd questionnaire that was sent to the heads in the ministries and the directors of the autonomous institutes had only 9 responses out of the 52 with a response rate of below 18%.

Respondent profiles for the 1st questionnaire:

- About 58% of the respondents were in the mid-age bracket of 35-50 years and another 37% were above 50 years of age.
- About 62% of respondents possess post-doctoral qualifications, with a strong emphasis on specialized research expertise. In addition, about 30% hold doctoral degrees.
- 5.7% of respondents hold post-graduate qualifications; while 0.6% have completed graduation. This distribution highlights the meticulous scholarly standards and elevated educational attainment of women STEM workforce.
- 97% of respondents carried out research activities, with some of them additionally having to teach or manage science, i.e. 63% and 37% respectively.

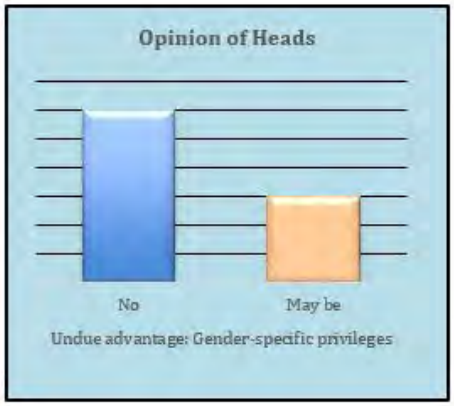
Respondent profiles for the 2nd questionnaire:

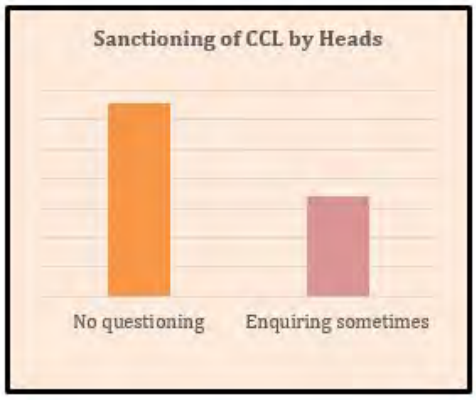
- Heads of divisons in the ministries and the directors of the autonomous institutes had only 9 responses of the 52 with a response rate of below 18%, having 5 responses from male Heads.

The analysis revealed that:

- Mid-level scientists have an average of about 43 publications. This grade also demonstrates a significant contribution to patents and awards. Scientist G stands out prominently with the highest total publications, averaging about 75, and leading in both patents and awards.
- Many women scientists have headed various committees, with 30.4% as Research Group Heads, 19.9% as Heads of IC, and 44.3% as Committee Representatives.
- Among the women respondents, about 9% reported experiencing sexual harassment in the workplace. Only 25% of these have indicated reporting the issue to a higher authority.
- The majority of respondents indicated that their profession allows them to effectively utilise their skills and abilities.
- One in four respondents rate their institutions on gender inclusivity based on their experiences as ‘average’ and another 17% feel that progress that concerted efforts to address disparities and promote inclusivity are required.
- The majority of respondents reported positive sentiments towards their job or assignment.
- 44% of respondents reported sometimes being overlooked for promotion despite eligibility, while 39% did not feel so.
- A significant portion (39%) of women respondents reported sometimes not being properly rewarded compared to their male colleagues, with 23% experiencing this very often.
- Only 28% stated they did not feel the need to work harder than male colleagues to prove parity.

- A significant number of women respondents (41%) reported sometimes missing out on grants due to less networking or awareness compared to their male colleagues.
- About three-fourths of the women had no compulsion to quit their previous jobs for any reason.
- There is a diverse source of support for child care, 36% of respondents opined that the organization provides services like daycare, while 64% stated that their organization does not offer daycare facilities (or they did not respond). This indicates that a significant portion of women working in STEM may face challenges in accessing childcare support within their organizations. There is a diverse source of support for daycare, with the most common being from their husbands (29%), followed by house-help (28%), parents (25%), and in-laws (18%).
- A significant majority of respondents i.e., more than four-fifths, reported being required to take care of old parents, in-laws, or siblings,
- The majority, more than three-fourths, indicated experiencing stress 'Sometimes' at work.
- However, access to Stress management programs was available for only 24% of respondents.
- Experience while traveling to other places for official work including accommodation arrangements, procuring travel grants or commuting was a very good or good experience for the majority of the respondents.
- Facilities at the workplace like feeding facilities are not available to 86% and daycare facilities are not available to 74% of the respondents.
- Meanwhile 42% of the respondents availed of the CCL and their experience in getting it sanctioned has been 'good always' for most of them.
- There were diverse attitudes of male colleagues towards women availing CCL.
- As per the 2nd questionnaire, more than half of the heads felt that not everyone in their organization avail the facility of CCL judiciously. But most of them sanction the CCL applications "most of the time" without questioning their staff.
- Encouragement for pursuing STEM was from own self for about half of the respondents while 46% credited it either to parents or teachers.
- Four-fifths received support from their families during their Ph.D. studies.
- 'Passion' was the dominant reason for taking up the S&T job.
- 27% indicated that they were not aware of the various government schemes for the support and encouragement of women in STEM.
- About half of the women have not availed of the various schemes meant for women in S&T.
- 87% of respondents highly recommend other women to opt for a career in STEM.





Comparison between the two studies conducted: CSIR Versus DST, DBT

- There is a dearth of female leadership at ministerial and institute levels in all the scientific establishments under these studies.
- DST has on average 20% women in the institutes while DBT has a better female representation with an average of 23 %. Women's representation in the S&T cadre is the lowest in CSIR i.e. about 17%.
- Sexual harassment of women has been observed within the surveyed group. Of the women who face sexual harassment, only 25% of cases were reported in both studies.
- Women are 'Passionate' about taking STEM careers & remain the predominant driving force. Self-motivation is the prime factor for taking up STEM in both studies.
- Most respondents in both datasets emphasise substantial family support during the challenging Ph.D. journey.
- In the CSIR study, more women were required to change their place of work.
- More awards to CSIR women respondents.
- Higher patent numbers of women respondents were observed in the present study.
- More women in the current study reported not being promoted despite eligibility than those women scientist in CSIR.
- There is a persistent challenge for women in networking which affects them in accessing funding opportunities.
- A general sentiment among women persists that they have to work harder than men to prove their capabilities.
- More women in DST and DBT institutes have shown their concern about disparities in recognition and rewards within their professional environments than CSIR women.

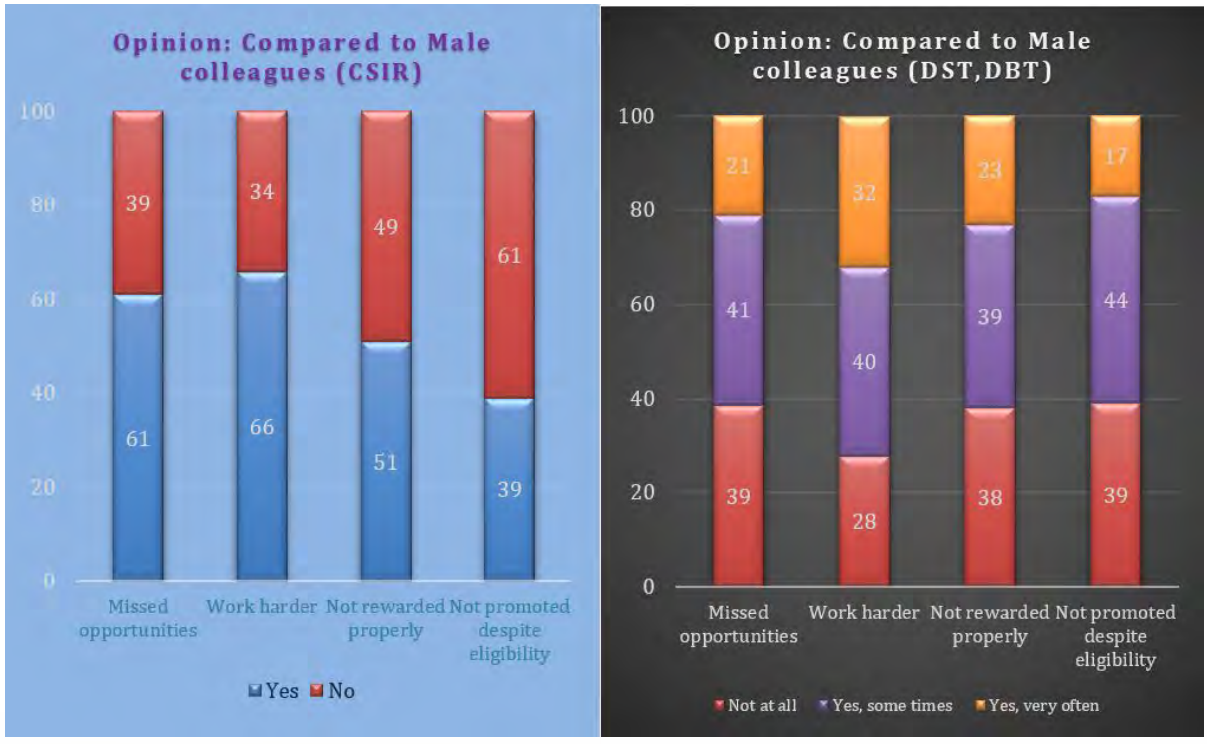


Figure: Perception comparison of the 2 studies (i) CSIR (previous study) and (ii) DST, DBT, DSIR (present study)

- It is a positive sentiment that women in all S&T establishments feel that their skills are being used productively.
- About four-fifths of the women in S&T have the added responsibility of taking care of old parents, in-laws, or siblings.
- Both studies show that women have a lot of stress and need to have access to stress management programmes.
- Not more than a fifth of the mothers have an essential facility of feeding room at their workplace.
- More women scientists have a daycare facility at DST, and DBT than in CSIR.
- Husbands have been playing an important role in taking care of children while there is still a dependence on parents, in-laws and house-help too.
- 'Not so easy' experience in getting travel grants for official purposes was observed for women scientists in DST, DBT affiliated institutes.
- Commuting in other cities has been easy and safe for most of the women scientists while on official work.
- 75% of women respondents reported 'satisfactory' to 'outstanding' experiences for arranging accommodation for official purposes, whereas the previous data indicated 56% found it easy.
- At least three-fourths of the women scientists 'highly recommend' other women to take up STEM as a career.
- Both studies show that most women are 'fairly' or 'highly' satisfied with their jobs.

Conclusion:

The study has been a rigorous one trying to dive deeper into the many efforts of the government and other agencies for promoting women in S&T for bringing in gender parity.

The assessment of the select scientific organization of India through the various initiatives and the primary survey conducted especially during this study has helped in evaluating these organisations and to some extent recommending policies, which if implemented, can improve the gender ratio in S&T, which in turn, will accelerate the progress of the nation. The gender representation in DST and DBT is above the national average, which is a good indication of bringing gender parity to S&T in the country. However, it is vital to look into the other S&T organisations of the country and the private R&D institutions where this ratio could be much lower resulting in the national average of women in S&T below 20%.

It is important to check the attrition and encourage girls to enhance from the enrolment level to opt for a scientific career. It is vital to disseminate awareness about STEM to women, encouraging them to come into and continue in STEM. Various studies have highlighted several recommendations for addressing the leaky pipeline in STEM. These primarily include leadership roles, mentorships, role models, and female peers. Others are mostly those that should be addressed at the educational levels like the engagement of parents and parents' influence for encouragement to take up STEM including those activities that will cultivate an interest in STEM like visits to science museums, parks, camps, etc. The awareness of parents and teachers on various schemes and financial support provided by schools, government organisations, and the private sector will prove to be very helpful in combating the leaky pipeline effect and narrowing the gender gap in STEM.

Meaningful intervention at the level of policy change is obligatory to bring gender parity. It is important to overcome the internal and external factors to address the issue of continuous loss of female workforce from enrolment level (49%) to graduation level (43%) to workforce level (less than 20%).

Encouragement to female students to choose STEM and continue their education through graduation, post-graduation, and further to pursue a doctorate is much needed through various efforts, some already being implemented by various government and private bodies and have been highlighted in this study. The % of females receiving INSPIRE Fellowships is about two-thirds over the past few years, indicating a positive step toward achieving gender parity in the coming years. The INSPIRE fellowships, etc. need to be continued with emphasis on scholarships to girls, increasing the number of fellowships and faculty fellowships with fair chance to women candidates. Girl students in engineering have been low with a very incremental growth. Incentives, awareness, and encouragement are required to improve this number.

Additional Initiatives for women-friendly environment (suggestion from Head of organisation) Women could be allowed for flexi-time/work from home, especially during the early part of their career. Another problem is for institutions to provide very good daycare facilities for the employees due to the small size and for long hours. If Government could help us establish long day care facilities for the many institutions together with ease of reaching and taking away kids, it would be a big help for the efficiency of working hours. Women's safe environment to be provided and preventive and punitive actions done efficiently.

Despite showing perseverance in completing the highest degree in STEM, only a few women manage to find a suitable professional employment opportunity. Things worsen at this stage in a woman's life because of child-bearing and child-rearing responsibilities. Thus the major problem

faced by the Indian science establishment lies not in educating and training women but in recruiting and retaining them in jobs. So, providing multiple measures to get past these concerns and creating systems to keep track of their implementation appears to be a major concrete option.

Several studies have emphasized the need for constant efforts to encourage gender equity and the formation of an accommodating work setting for women in STEM. It is suggested that there can be an increase in awareness in tier 2 and tier 3 cities along with rural areas.

Monitoring and evaluating various roles of both men and women within the organisation will help narrow the Gender parity gap. Adequate strategies targeting capacity building among women to strengthen their role in STEM are urgently required. Organizations need to empower women in S&T through training, skilling, and providing an enabling environment. It is necessary to have further initiatives and programs at the government as well as the private level for attracting, encouraging and retaining women in STEM fields.

Policy interventions are pivotal in achieving gender parity, aiming to place more women in influential positions within the science and technology domain. Women in leadership roles have been on the rise. It was observed that "there has been a lot of receptiveness and acceptance of women in leadership roles however, the sensitization about roles and responsibilities at organization level should be provided to new entrants/scientists". There should be 'Age relaxation for women in leadership positions' as suggest by some heads through the survey.

Gender representation in leadership positions might have seen a rising trend in the last few years but there is a long way to go. At the ministerial level, there have been very few women secretaries and few women directors at the institute level, which can be looked into. There is a fairly good representation of women in the ministries at S&T fields which is a positive inclusivity sign for India's growth. The same can be emphasized for the women S&T workforce in several of the autonomous institutes of DST and DBT having above national average representation. Institutes in the Southern part of the country have the best women representation in S&T.

The gender representation in research roles as PIs and Co- PIs has shown that women are lesser than their representation in DST and DBT institutes. Although the funding is not restricted to these institutes, women scientists need encouragement at various levels to apply for funding and have their project ideas selected without bias. Issues faced by scientists and engineers in the current tight financial climate pose even more serious challenges for women, due to the drying up of funding sources and economic incentives.

Increased participation of women in science must include more women occupying critical roles in the science and technology community. More women should be encouraged and given responsibilities at every stage, including prominent positions such as key speakers at conferences, deputation assignments, editors of reputed journals, institutional committees, etc., especially in the S&T arena.

A fair number of women scientists have been handling teaching and management of science apart from their research activities portraying their multi-tasking abilities. Their research activities involve, other than publications, fellowships of various bodies, Professional Memberships and Editorial Roles, Technology Transfer and Patenting, International Collaborations and various Recognitions, etc.

Comprehensive studies in India to examine organisational gender dynamics, including men's roles in fostering equality, is imperative for progress Gupta's (2019). Overcoming internal and external obstacles is key to combating the continuous decline of female representation from enrollment to graduation and, ultimately, the workforce, countering the detrimental leaky pipeline effect.

The quality of work-life is an important concern for working women for the best productivity. Their roles and responsibilities at work and family are often conflicting, having to oscillate between family and workplace, with contradictory roles. The study revealed a strong perception of productive skill utilization, the majority of them have had a 'good & above average' experience with gender neutrality experiences in their organisations showing that

"The best thing would be for the States and Union Government to help in bringing together the institutions and organizations to create common facilities which can be effective; one example would be to provide daycare facility near institutions."

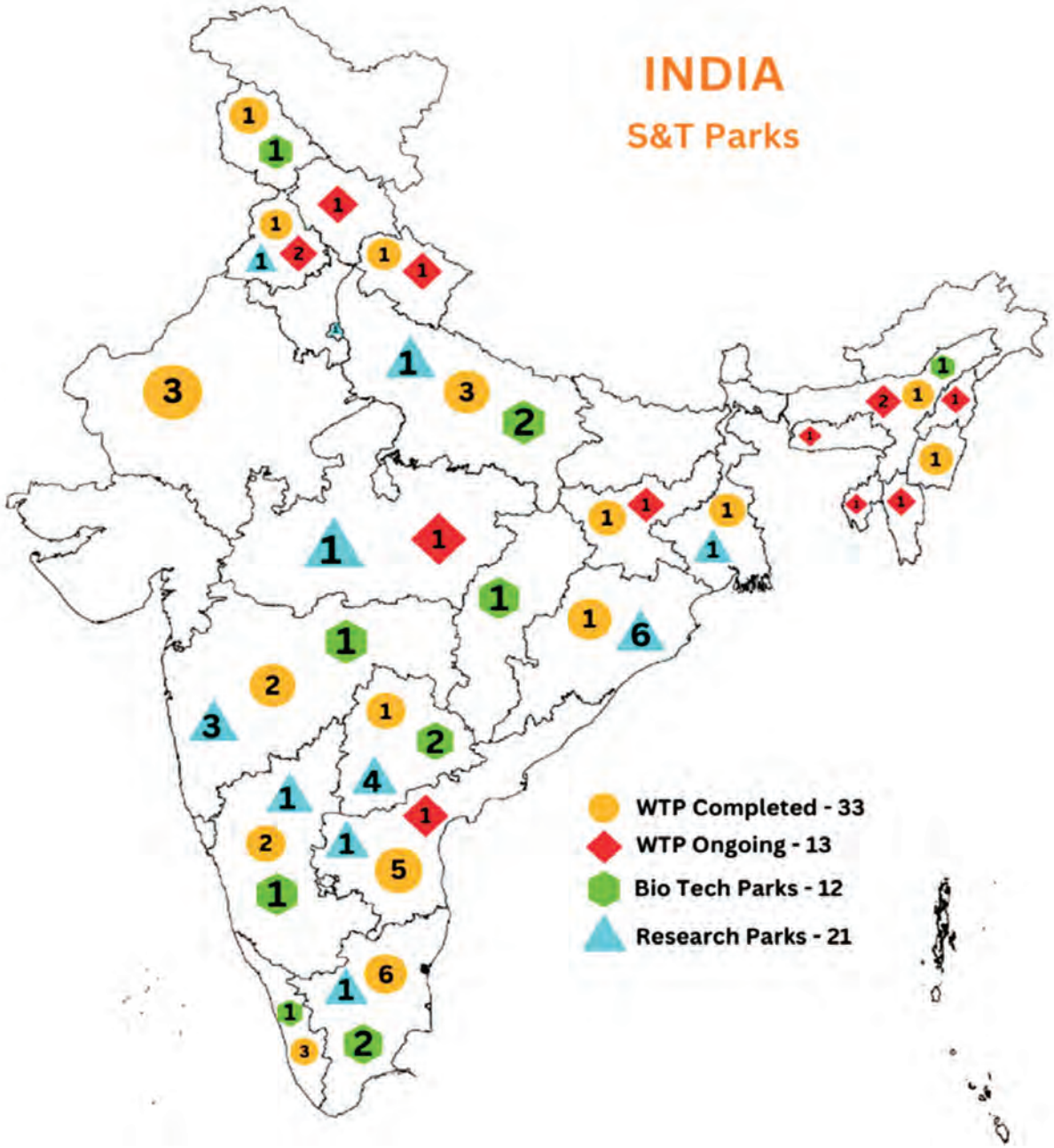
the S&T arena is moving towards gender inclusivity. However, there is still scope for improvement. Although, a positive sentiment towards their job or assignment, about 44% of respondents reported 'sometimes' being overlooked for promotions despite eligibility, 39% were 'sometimes not being properly rewarded' compared to their male colleagues, about three-fourths reported sometimes/ very often having to exert additional effort to prove parity with male colleagues. More than three-fifths of the respondents felt that they had missed out on the grants due to lack of networking which raises a concern of the strategies that could be adopted to overcome this.

Several women face challenges for accessing childcare support within their organizations. Women's role as mothers requires facilities that can help them manage work better, like daycare and feeding facilities. All these factors could lead to stress which was found to be prevalent among women scientists with not many having access to stress management. Access to stress management programme highlights an area that may require attention and improvement; as the lack of stress management programs may be a potential gap in support services among women in STEM. Also, childcare leaves might make their jobs easy but the utilization has to be judicious as found from the 2nd questionnaire, i.e. heads of the organisations.

Workplaces need to be gender neutral where women can work without fear of harassment, especially of a sexual nature. The study has shown a prevalence of sexual harassment as an issue in the workplace, though with a lower incidence rate among the surveyed women. Also, of those who reported experiencing sexual harassment at work, only 25% have indicated reporting the issue to a higher authority which was also found in the earlier studies of the authors. This is required to be addressed seriously and awareness be created.

The prevention of sexual harassment of women needs special attention and specific policies. Providing confidence and support to women is of utmost importance so that they can report any harassment they face, especially that which can be categorised as sexual. The iGOT modules like Stress Management and Sexual Harassment Training should be promoted to foster a supportive work environment.

Women have been mostly 'passionate' about their careers and taking up STEM assignments. Similarly, they highly recommend other women to take up S&T as a career choice. However, not many women are aware of the various facilities and schemes that the government provides to women scientists, and it is therefore felt that there have to be ways and means by which this awareness levels increase and more and more women avail of the schemes for the progression in their careers. Disseminating information about STEM to women and encouraging women to enter this field should be an important policy goal. To conclude, institutions should be ranked and rewarded based on their performance in gender equity and policy to promote inclusivity. It's encouraging that for the empowerment of women special programs are being organised at various levels, Government as well as by the Private sector. One such example is the Tata group's initiatives to empower women in Tata Steel, "Tejaswini" a pioneering empowerment programme for office girls willing to operate heavy motor equipment." With these initiatives, we can expect enhanced empowerment of women in Science and Technology.



Source: Prepared by authors by compiling all information from various websites

Recommendations

Some of the recommendations which however follows from the present study are:

- Recalibration/inclusive policies are required.
- Increase in the budget for better outreach
- Outreach through programmes like Maan ki baat, etc. be initiated for awareness.
- Not just the number but also the role of women should be enhanced!
- Academic age should be relaxed for women at entry levels to careers
- Exposure Visit to Nordic and other countries to understand gender equality.
- Recalibrating the system
- Initiation of an Equal Responsibility Program.
- Flexi time/work-from-home options for women,
- Creation of/ providing facilities for working mothers like feeding rooms and daycare near institutions.
- Collaboration for creating common facilities between States, Union governments, institutions, and organisations.
- Financial and spatial viability challenges for small organisations.
- Prevention and efficient punitive actions ensuring a safe environment for women at work.
- Exit interviews should be made mandatory for women leaving the organisations to know the circumstances in which they want to quit so that appropriate steps can be taken by the organisation.
- Increased awareness in Tier 2 & Tier 3 cities along with rural areas.
- Age relaxation of women in leadership roles.
- Focus on quality of work life with a proper work life balance.
- Stress Management & Sexual Harassment training should be mandated to promote a supportive work environment.
- Information dissemination on various government scheme for promoting STEM careers among women.
- Workshops should be organized on:
    a. Roles and Responsibility at the Organisation level,
    b. Work-life Balance,
    c. Leadership Roles, etc.

This is a concise version of a detailed report titled “Initiatives for Empowering Women in Science & Technology: A critical evaluation” based on an in-house study.

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