

Project Completion Report

Assessment of Government of India's Gender Mainstreaming Programs for Women in Science

Implemented

By

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Preface

Gender mainstreaming is a strategy and process to assess - through the use of a gender analysis, which produces gender indicators and statistics - the implications of planned policies and programmes. It recognizes the need to make the different (social and economic) experiences of men and women an integral dimension of the design, implementation, monitoring and evaluation of these policies and programmes, to ensure fair results for women/girls and men/boys. In order to Mainstream Gender for women in science, one needs to take into account: 1. Who are the stakeholders of a project, 2. What kind of consultations need to take place and with what target groups and 3. What are the expected impacts (positive and negative) of the policy / programme on each group of stakeholders? A society's wellbeing depends on ensuring that all its members feel that they have a stake in it and do not feel excluded from the mainstream. Every individual and all peoples are entitled to participate in, contribute to and enjoy civil, economic, social, cultural and political development in which all human rights and fundamental freedoms can be fully realized. This requires all groups, but particularly the most vulnerable, to have opportunities to improve or maintain their well-being. GMS and women's empowerment - are in no way in competition with each other... The two strategies are complementary in a very real sense as gender mainstreaming must be carried out in a manner which is empowering for women... The empowerment of women concerns women gaining power and control over their own lives. It involves awareness-raising, building self-confidence, expansion of choices, increased access to and control over resources and actions to transform the structures and institutions which reinforce and perpetuate gender discrimination and inequality. Inputs to promote the empowerment of women should facilitate women's articulation of their needs and priorities and a more active role in promoting these interests and needs. Empowerment of women cannot be achieved in a vacuum; men must be brought along in the process of change. In the present project on "Assessment of Government of India's Gender Mainstreaming Programs for Women in Science". Survey data constitutes the resultant data that was collected from women scientist- respondents that took a survey. This data is comprehensive information gathered from a target women scientist about several aspects pertaining to basic information to research impact. There are many methods that were used for survey data collection and statistical analysis.

Acknowledgement:

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The Principal Investigator acknowledges the sincere support and active participation of the project fellows, Mr. Pavan Ponnappa and Ms. Ananya S who worked under this project. The editorial help rendered by Mr. Adel Mutahar is sincerely acknowledged.

Assessment of Government of India's Gender Mainstreaming Programs for Women in Science

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Chapter 1

Introduction, Objectives, Limitations

1.1 Introduction

In India, the rapid expansion of science and technology has taken place in the post-Independence era. The principle of gender equality is enshrined in the Indian Constitution in its Preamble, Fundamental Rights, Fundamental Duties and Directive Principles. The Constitution not only grants equality to women, but also empowers the State to adopt measures of positive discrimination in favor of women.

The institutional structures that have evolved to promote the growth of science and technology can be classified as those funded by the Central Government, State Governments, higher education sector, public and private industry and non-profit institutions and associations. It is seen that there exists wide variance in women scientist's participation in these agencies. Very few women have been part of these structures, especially in the research and development activities at senior positions. However, the information available on the status and position of Indian women scientists, in the respective work spheres is not adequate. More research of empirical nature along with gender de-segregated data is essential. One such initiative is Assessment of Government of India's Gender Mainstreaming Programs for Women in Science.

In recent years, the Government of India (the department of Science & Technology and UGC) is giving enormous attention to the importance of women's education and is making serious attempts at imparting high level skills to women. Special scholarships and awards have been instituted to attract students in general and women in particular to the science and technology stream. Department of Science and Technology (DST), India, has been actively engaged in creating an ecosystem and enabling an environment for women in S&T domain. DST through its various schemes and programs is working towards the cause of promoting women in science. Women Scientist Scheme (WOS) was launched in 2002, to address the challenges faced by women due to various reasons. In 2014, DST restructured all women specific programs under one umbrella called Knowledge Involvement in Research Advancement through Nurturing (KIRAN). The mandate of KIRAN programme is to bring gender parity in S&T through gender mainstreaming. Different components of KIRAN deal with various crucial women-centric issues such as break in career, self-employment, part-time career, relocation, etc. faced by women in their career path.

Women technology parks (WTPs) act as a single window hub for convergence of diversified technologies, leading to socio-economic development of women through capacity building and adoption of location-specific technologies. Diverse technology areas like agriculture, including fisheries, animal husbandry, horticulture, aromatic and medicinal plants, forestry, alternate livelihoods, postharvest technologies, natural resource management, health and sanitation, occupational hazards, management of natural resources, sustainable agricultural practices, etc. form the core areas of interventions. Another new component, INDO-US Fellowship for Women in STEMM (WISTEMM) initiated in 2017–18 aims to provide opportunities to Indian women scientists, engineers and technologists to undertake international collaborative research in premier institutions in USA to enhance their research capacities and capabilities. To address the issue of low representation of women in Science and Technology (S&T) domain, particularly in planning and policymaking, DST constituted ‘Standing Committee for Promoting Women in Science’ in March 2016 with representation of eminent Scientists/Educators/Administrators. In addition to major efforts by the DST, many other departments and agencies are also working to enhance participation of women in science. Department of Biotechnology (DBT) has a programme called **BioCARE**. It aims to promote women in biological sciences. BioCARE is supporting both employed and unemployed women scientists on their first grant. UGC has post-doctoral fellowship for women (UGC-PDF) which is a 5-year programme with 100 positions in which 50 are for science and 50 for humanities with upper age limit as 55 years. Then there is PG Indira Gandhi Scholarship for Single Girl Child under which support is provided for two years (10 months per year) with maximum age for the scholarship being 30 years.

While much needs to be done in gender mainstreaming in the Indian context, these initiatives will act as a positive reinforcement to other on- going efforts and it is hoped that they will help to bring favorable policy changes and constructive.

While a quantifiable increase in the number of women beneficiaries remains an important indicator, the regional context and environmental factors (which could affect implementation directly or indirectly) should also be taken into account to understand the gender mainstreaming efforts of Govt. of India.

Consequently, the access of women particularly those belonging to weaker sections including Scheduled Castes/Scheduled Tribes/ Other backward Classes and minorities, majority of whom are in the rural areas and in the informal, unorganized sector – to education, health and productive resources, among others, is inadequate. Therefore, they remain largely marginalized, poor and socially excluded.

Gender mainstreaming requires policymakers and enforcers to confront the effects of every decision they take at the macro level and take stock of whether it has positive, negative or negligible consequences for women. Programs should be strengthened to bring about a greater involvement of women in science and technology. These may include measures to motivate girls to take up science and technology for higher education and also ensure that development projects with scientific and technical inputs involve women fully. Efforts to develop a scientific temper and awareness should also be stepped up.

A Report from Indian Express:

The International Day of Women and Girls in Science celebrated on February 11. It is established by the United Nations to promote equal access to and participation in science for women and girls.

UNESCO report on women in science:

- As per UNESCO, globally just **28.8% of researchers are women**. It defines researchers as “professionals engaged in the conception or creation of new knowledge”. In India, only **13.9% of researchers are women**
- Between 1901 and 2019, 334 Nobel Prizes have been awarded to 616 Laureates in Physics, Chemistry, and Medicine, of which just **20 have been won by 19 women**.
- **Only around 30% of female students select STEM** (science, technology, engineering, and mathematics)-related fields in higher education.
- Female enrolment is particularly low in information technology (3%), natural science, mathematics and statistics (5%) and engineering and allied streams (8%).

NITI Aayog report:

- In 2015-16, 9.3% of female students in undergraduate courses were enrolled in engineering, compared to 15.6% across genders. 4.3% of female students were enrolled in medical science, compared to 3.3% across genders.
- Over 620 institutes and universities, including IITs, NITs, ISRO, and DRDO, the **presence of women was 20.0% among Scientific and Administrative Staff**, 28.7% among Post-Doctoral Fellows, and 33.5% among Ph.D. scholars.

Why the gender gap?

- Girls excel at mathematics and science-oriented subjects in school, **but boys often believe they can do better**, which shapes their choices in higher studies.
- The difference in maths scores between high-achieving boys and girls was the equivalent of about half a year at school. But when comparing boys and girls who reported similar levels of self-confidence and anxiety about mathematics, the gender gap in performance disappeared — when girls were more anxious, they tended to perform poorly.

1.2 Aim: The main aim of the DST funded project is:

“Assessment of Government of India’s Gender Mainstreaming Programs for Women in Science”. **DST Project No:** DST/NSTMIS/05/211/2016-17 dated 19.11.2018

1.3 Approved Objectives of the Proposal:

Having administered large number of funding schemes and programs time-to-time, it is impossible for the Government of India to measure and trace the impact merely based on the data submitted by the individual Women Scientists or respective organizations at the end of the completion of the project and consecutive funding support. Since, the nature of support is targeted toward overall professional development, the resulting impact can only be determined by tracking individual’s progress over period of time. Therefore, in order to evaluate impact of these schemes and programmes, NSTIMS Division of Department of Science and Technology, Government of India has initiated a program and provided financial assistance for conducting a study to evaluate its gender mainstreaming programs. This network project thus offers an

approach to evaluate the impact of women scientist by way of conducting a survey to evaluate its gender mainstreaming programs both at regional and national level. The approved objectives of proposal are to:

- To evaluate impact and perform the analysis of multiple funding programs of DST's, DBT and UGC targeted at gender mainstreaming using appropriate analytical frame work and systematic study by systematically collecting data during the period from 2003-2018.
- To determine analytical framework to measure the professional development related to gender mainstreaming from the patterns and trends revealed by data analysis.
- To develop a web-based portal that will enable the beneficiaries:
 - a. to provide all the funding related details along with key indicators used in data collection to maintain live professional records of all beneficiaries across schemes
 - b. to act as important reference for potential beneficiaries of ongoing and future programs
 - c. to create interactive dashboard showing key performance indicators that will enable decision makers to keep track of the impact and progress across various categories and criteria.

Chapter 2

Review of Literature

2. STUDY REGION

2.1 Introduction

Karnataka is an Indian state located in the south of India. Its capital is Bangalore. Karnataka has an area of 1,91,976 square kilometers. Which is 5.83% of the total geographical area of India. It is the eighth largest state in the country in terms of area. This state was formed on 1 November 1956 under state reorganization. Earlier it was called Mysore State. It was renamed Karnataka in 1973. It shares its borders with Maharashtra in the north, Andhra Pradesh in the east, Kerala in the south, Arabian Sea in the west, Goa in the north-west and Tamil Nadu in the southeast. The most spoken language here is Kannada.

2.2 About the State: Districts of Karnataka

The detail analysis of Population Census 2011 published by Govt. of India for Karnataka state reveal that population of Karnataka has increased by 15.60% in this decade compared (2001-2011) to past decade (1991-2001). The density of Karnataka state in the current decade is 825 per sq mile.

- Karnataka is an State of India with population of Approximate 6.11 Crores.
- The population of Karnataka state is 61,095,297.
- The density of Karnataka state is 319 per sq km.
- Karnataka State is spread over 191,791 Sq Km.
- **The following are the districts of Karnataka. TABLE 2. 1**

BELGAUM DISTRICT	BAGALKOT DISTRICT	BIJAPUR
BIDAR	RAICHUR	KOPPAL
GADAG	DHARWAD	UTTARA KANNADA
HAVERI	BELLARY	CHITRADURGA
DAVANAGERE	SHIMOGA	UDUPI
CHIKMAGALUR	TUMKUR	BANGALORE
MANDYA	HASSAN	DAKSHINA KANNADA
KODAGU	MYSORE	CHAMARAJANAGAR
GULBARGA	YADGIR	KOLAR
CHIKKABALLAPURA	BANGALORE RURAL	RAMANAGARA



Figure 2.1 KARNATAKA STATE

2.3 Education & Literacy Scenario in Karnataka – Education plays a vital role in the growth and development of the economy. After the enforcement of compulsory and free education, India witnessed a literacy rate of 74.04% as per the population census of 2011. The same source mentions 75.36% as the overall literacy rate of Karnataka. Male and female literacy rates in the state are 82.47% and 68.08%,

respectively. Among all the districts of the state, Dakshina Kannada District has the highest literacy rate of 88.57%. The lowest literacy rate in the state is 59.56% in Yadgir district.

As per the Department of Education of Karnataka, there are a total of 73,417 schools, which include 59,555 primary schools and 13,862 high schools. The total number of primary teachers in the state is 2,05,146 and 23,225 posts are still vacant. At the secondary school level, the total number of teachers is 80,731 out of which 68,579 teachers are actively working.

The state government has launched the mid-day meal scheme to ensure nourishment of the students studying in government and aided schools. Apart from this, the National Programme for the Education of Girls (NPEGEL), and Sarva Shiksha Abhiyan are also implemented in the state. Kannada and English are the medium of instruction in the state-run schools whereas in private schools, colleges and universities, English is preferred as the medium of instruction.

Till now the education system in the state is based on the 10+2+3 pattern but now, as per the new education policy announced by the government of India, the state will be following the education pattern of 5+3+3+4. The syllabus taught in the schools of Karnataka is based on the Central Board of Secondary Education (CBSE), National Institute of Open Schooling (NIOS), Indian School Certificate Examinations (ICSE), and Karnataka Secondary Education Examination Board (KSEEB).

As per the report of All India Survey on Higher Education (AISHE), the state has a total of 3594 colleges, out of which 2923 are private colleges, 461 private-aided colleges, 2462 private un-aided colleges, and 671 government colleges. The total number of universities in the state is 65, out of which 28 are state public universities and 16 state private universities. Apart from this, the National Institute of Technology, Karnataka, is on the 22nd rank as NIRF ranking.

Quality of Education in Karnataka

As per the 2011 census of India, Karnataka has an overall literacy rate of 75.60%. The literacy rate in the rural area of the state is 68.86%, in the urban area it is 86.21%. The literacy rate of the male population is always higher than the literacy rate of the female population in the state. The male and female gender

differential rate is 14.72% as per the census of 2011 in the state. However, the regional differential rate is 17.35% as per the district-wise literacy rate analysis of Karnataka.

Table 2.2 and Figure 2.2: Literacy in Karnataka (Absolute Data)

Category	Rural	Urban	Total
Male	1,28,93,437	96,15,034	2,25,08,471
Female	97,55,739	83,83,112	1,81,38,851
Total	2,26,49,176	1,79,98,146	4,06,47,322

Data Source: Census of India 2011.

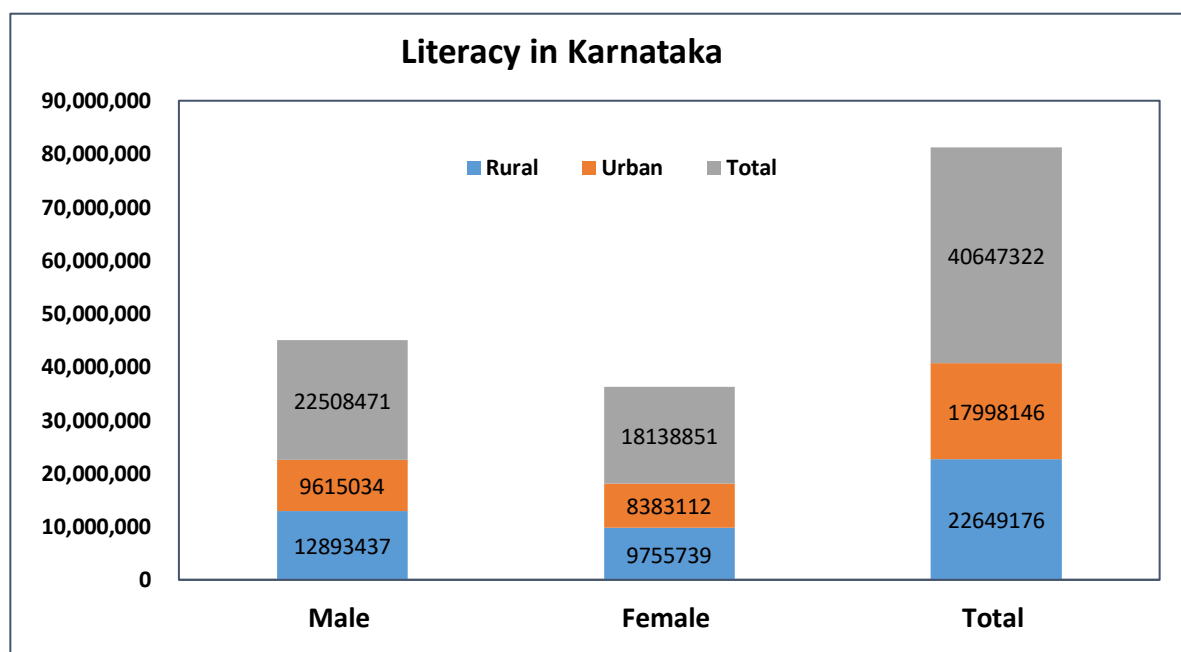


Table 2.3 and Figure 2.3: Literacy Rate in Karnataka Rural and Urban scenario

Category	Rural	Urban	Total
Male	77.6	90.0	82.5
Female	59.7	81.4	68.1
Total	68.7	85.8	75.4

Data Source: Census of India 2011

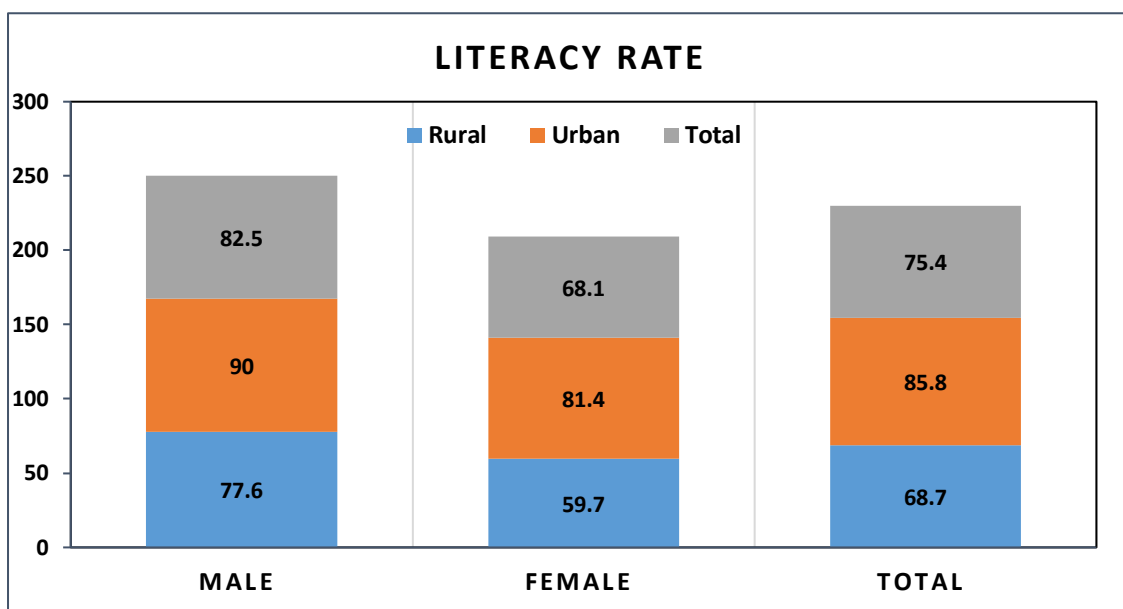


Table 2.4 and Figure 2.4: Total Universities in Karnataka

Type of Universities	Total Number
Central University	01
Institute of National Importance	04
State Public University	28
State Open University	01
State Private University	16
Deemed University Government	04
Deemed University Private	11
Grand Total	65

Data Source: Report of All India Survey on Higher Education (AISHE)

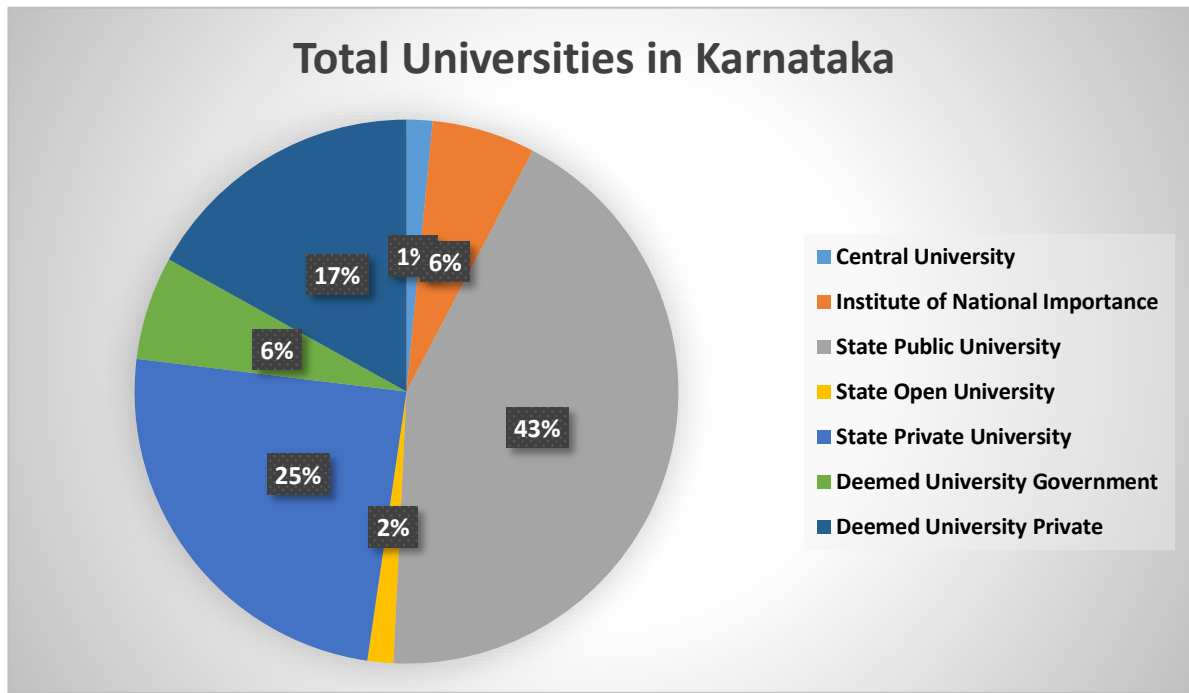


Table 2.5 and Figure 2.5: Total Number of Schools in Karnataka

Schools Category	Education Department	Social Welfare + Local Body	Aided	Un – Aided	Central + Others	Total
Lower Primary Schools	22,599	168	228	2,951	5	25,951
Higher Primary Schools	22,601	560	2,339	8,009	95	33,604
Total Primary Schools	45,200	728	2,567	10,960	100	59,555
High Schools	4,437	490	3,335	5,521	79	13,862
Total Schools	49,637	1,218	5,902	16,481	179	73,417

Data Source: Department of Education Government of Karnataka

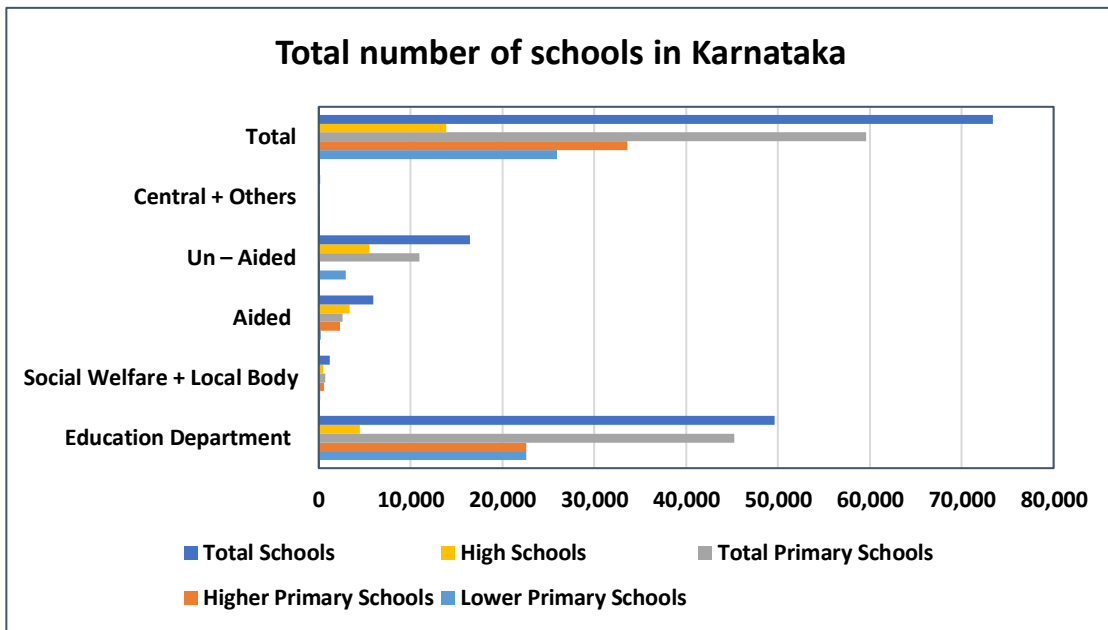


Table 2.6 and Figure 2.6: Total Number of Colleges and their enrolments in Karnataka

Type of Colleges	Total Number	Total Enrolments
Private Un – Aided	2462	777067
Private Aided	461	329400
Total Private	2923	1106467
Government	671	425978
Total	3594	1532445

Data Source: Report of All India Survey on Higher Education (AISHE)

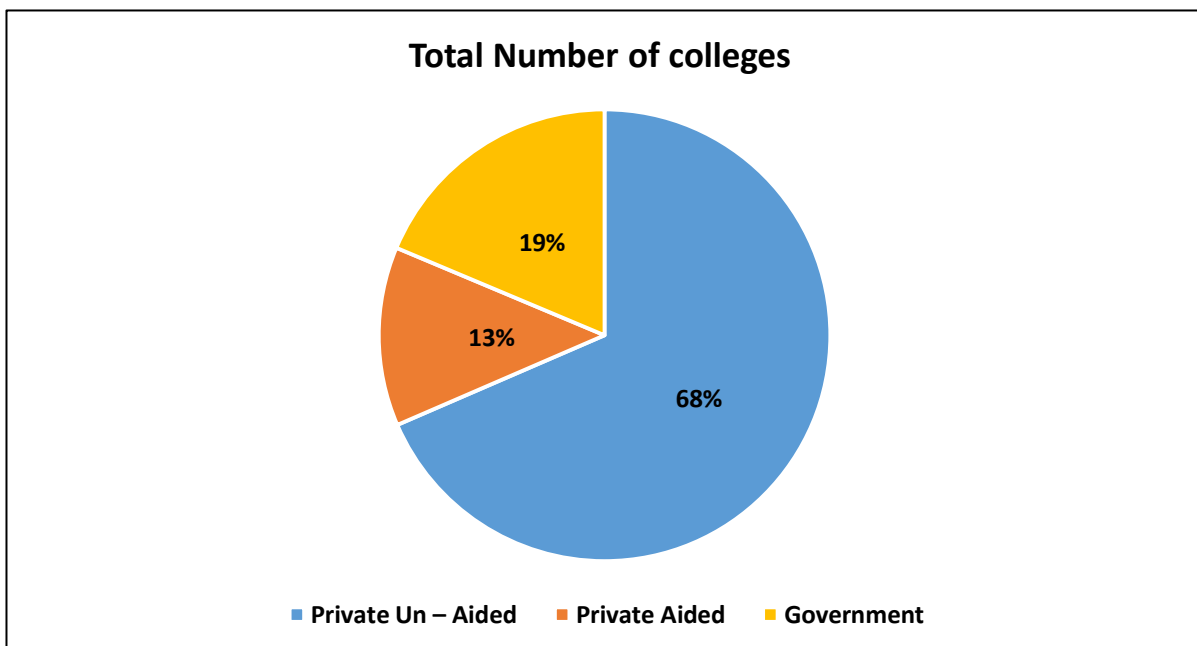
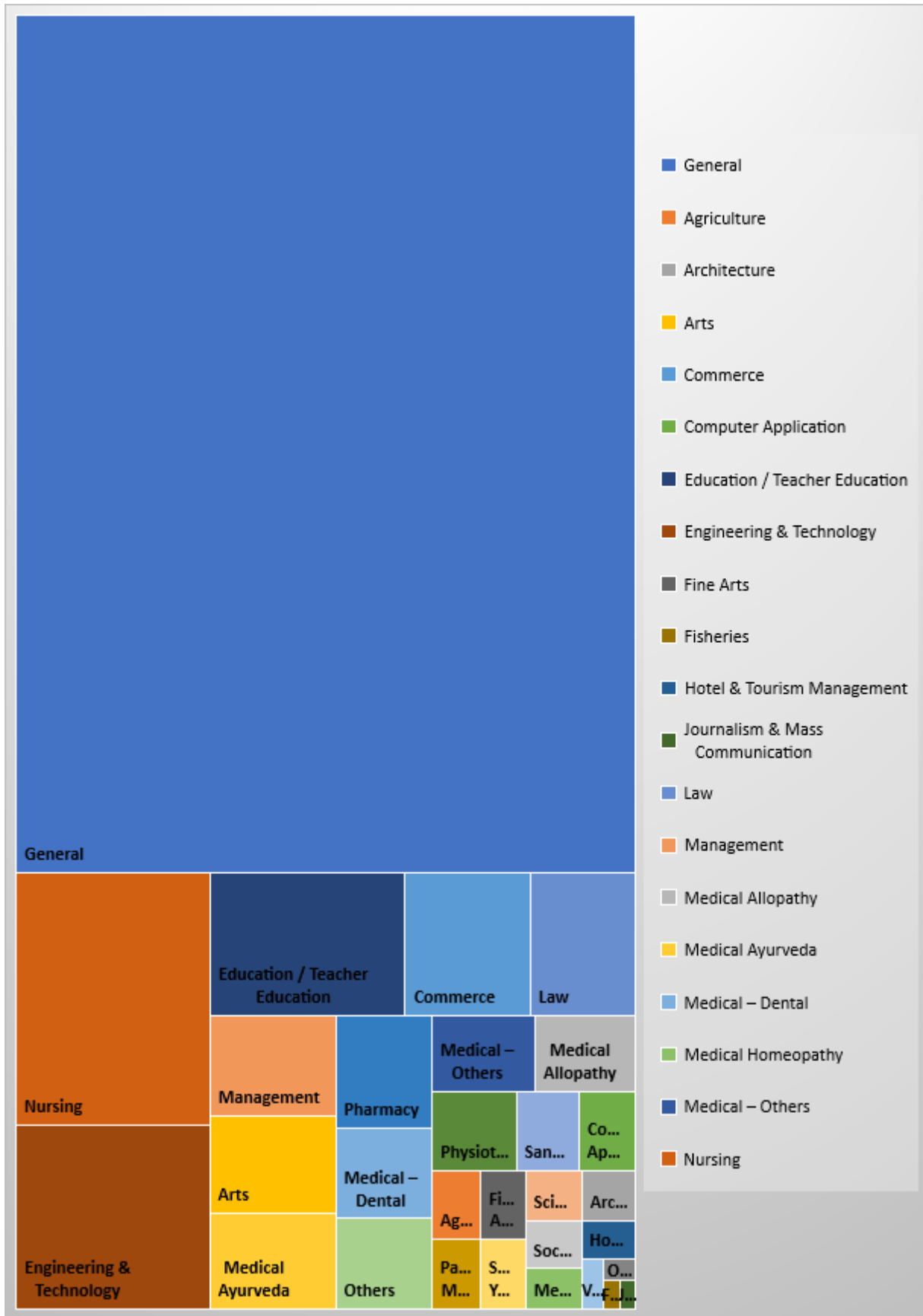


Table 2.7 and Figure 2.7: Specialization – wise number of colleges

Specialization	Number of Colleges	Specialization	Number of Colleges
General	2383	Medical Allopathy	34
Agriculture	15	Medical Ayurveda	54
Architecture	12	Medical – Dental	39
Arts	55	Medical Homeopathy	10
Commerce	80	Medical – Others	35
Computer Application	20	Nursing	219
Education / Teacher Education	125	Oriental Learning	03
Engineering & Technology	160	Para Medical	15
Fine Arts	14	Pharmacy	49
Fisheries	02	Physiotherapy	30
Hotel & Tourism Management	09	Sanskrit	22
Journalism & Mass Communication	02	Science	13
Law	67	Social Work	12
Management	57	Sports / Yoga / Physical Education	14
Veterinary	05	Others	39
Grand Total			3594

Data Source: Report of All India Survey on Higher Education (AISHE)



Schools in Karnataka as per the official data, there are a total of 73,417 schools in Karnataka, which include 59,555 primary schools and 13,862 high schools. The list of schools is given below:

Government Colleges in Karnataka

There are total of 412 colleges in the state as per the list issued by the Department of Collegiate Education, Karnataka. The list of some government colleges in Karnataka is provided below.

Universities in Karnataka

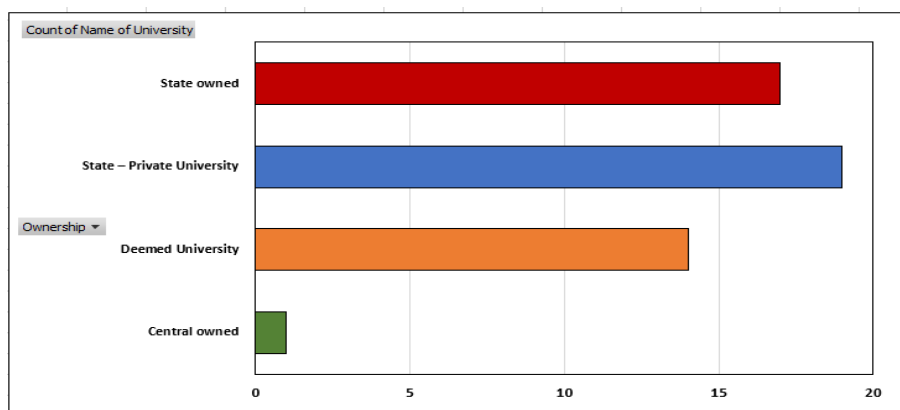
The list of universities as per their category in the state is provided below.

Table 2.8 and Figure 2.8: List of Universities

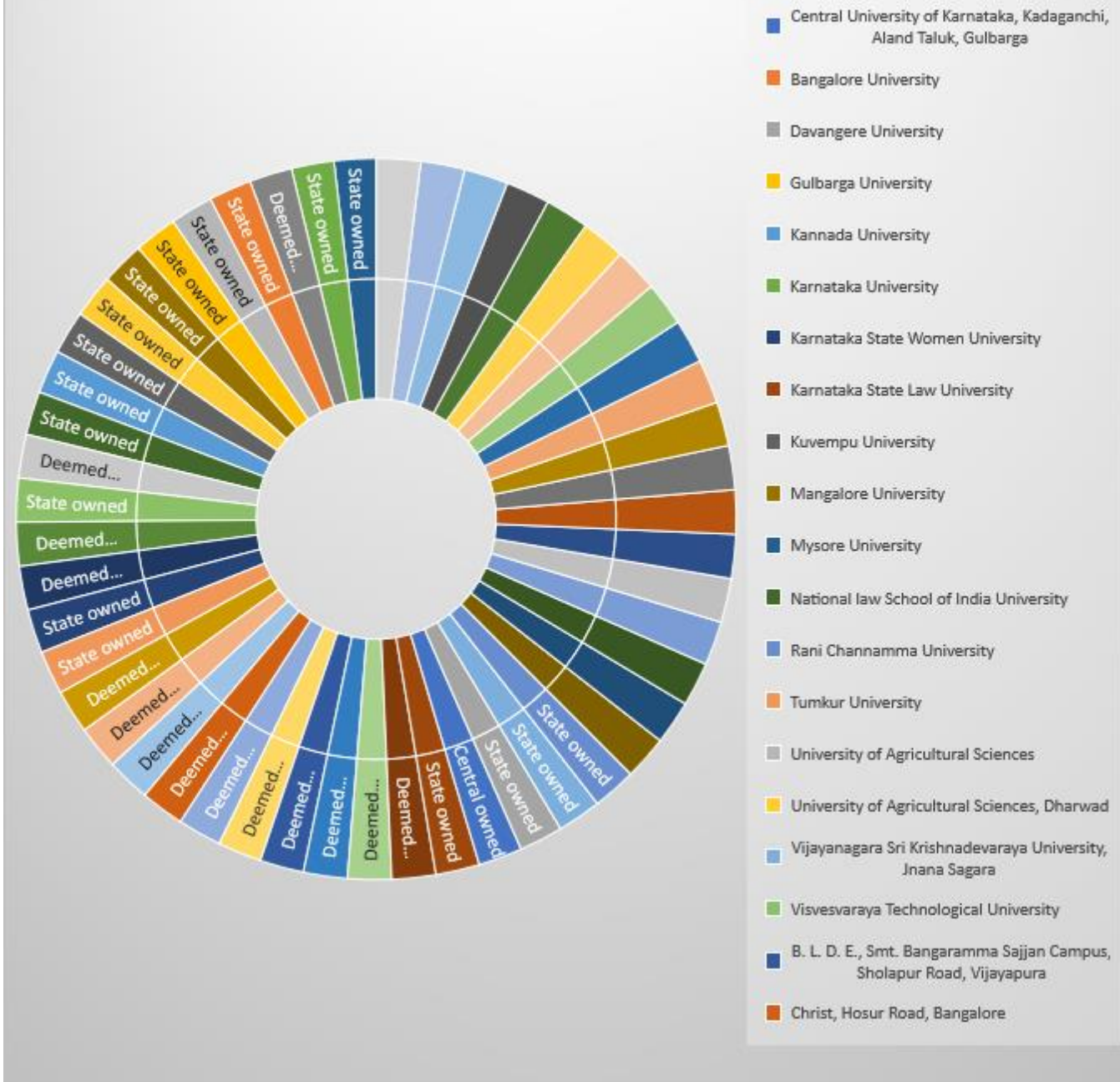
Name of University	Ownership	Year
Central University of Karnataka, Kadaganchi, Aland Taluk, Gulbarga	Central owned	2009
Bangalore University	State owned	1964
Davangere University	State owned	2009
Gulbarga University	State owned	1980
Kannada University	State owned	1992
Karnataka University	State owned	1949
Karnataka State Women University	State owned	2004
Karnataka State Law University	State owned	2009
Kuvempu University	State owned	1987
Mangalore University	State owned	1980
Mysore University	State owned	1916
National law School of India University	State owned	1992
Rani Channamma University	State owned	2010
Tumkur University	State owned	2004
University of Agricultural Sciences	State owned	1964

University of Agricultural Sciences, Dharwad	State owned	1986
Vijayanagara Sri Krishnadevaraya University, Jnana Sagara	State owned	2010
Visvesvaraya Technological University	State owned	1999
B. L. D. E., Smt. Bangaramma Sajjan Campus, Sholapur Road, Vijayapura	Deemed University	2008
Christ, Hosur Road, Bangalore	Deemed University	2008
Indian Institute of Science, Bangalore	Deemed University	1958
International Institute of Information Technology	Deemed University	2005
J. S. S. Academy of Higher Education & Research, Jagadguru	Deemed University	2008
Jawaharlal Nehru Centre for Advanced Scientific Research	Deemed University	2002
Jain, Dr. A. N. Krishna Rao Road, V. V. Puram, Bangalore	Deemed University	2008
K. L. E. Academy of Higher Education and Research	Deemed University	2006
Manipal Academy of Higher Education	Deemed University	1993
NITTE, University Enclave, Medical Sciences Complex	Deemed University	2008
Sri Devraj Urs Academy of Higher Education and Research	Deemed University	2007
Sri Siddhartha Academy of Higher Education	Deemed University	2008
Swami Vivekananda Yoga Anusandhana Samsthana	Deemed University	2002
Yenepoya, University Road, Deralakatte, Mangaluru	Deemed University	2008
Adichunchanagiri University	State – Private University	2018
Alliance University, Bangalore	State – Private University	2010
Azim Premji University	State – Private University	2010
CMR University	State – Private University	2013
Dayanand Sagar University	State – Private University	2013
Garden City University	State – Private University	2014

Institute of Trans – Disciplinary Health Sciences and Technology	State – Private University	2013
J. S. S. Science & Technology University, J. S. S. Technical Institutions Campus, Mysuru	State – Private University	2016
Khaja Bandanawaz University	State – Private University	2018
K. L. E. Technological University, B. V. Bhoomaraddi College	State – Private University	2015
M. S. Ramaiah University of Applied Sciences	State – Private University	2013
P. E. S. University	State – Private University	2013
Presidency University	State – Private University	2013
Reva University	State – Private University	2013
Rai Technology University	State – Private University	2014
Sharanabasava University	State – Private University	2017
Shri Dharmasthala Manjunatheshwara University	State – Private University	2018
Srinivas University, Srinivas Group of Colleges Campus	State – Private University	2015
Sri Sathya Sai University for Human Excellence	State – Private University	2019



Karnataka Universities

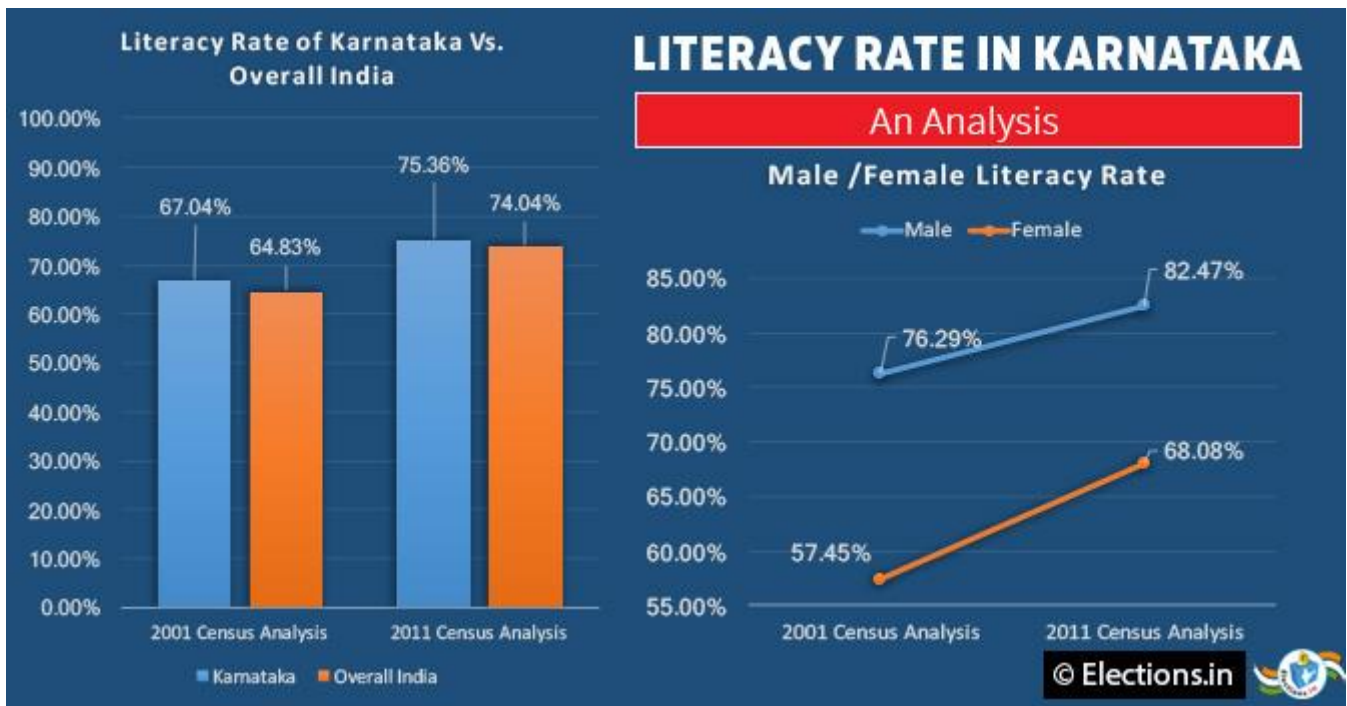


Polytechnic Institutes in Karnataka

The state hosts approx. 170 polytechnic institutes.

B.Ed Colleges in Karnataka

As per the National Council for Teacher Education, more than 1500 colleges are offering B. ed courses.



The economic development of a country is possible only when the citizens of the country are literate. Education improves an individual from within. It also develops his overall personality and stimulates a sense of civic responsibility in him. Education is given top priority by all the state governments in India. The government of Karnataka has given high priority to education and the state's social welfare department has launched several developmental programs, schemes and scholarships to promote literacy in the state. To bring education to the door step of the underprivileged children, the government has provided various facilities. For children, who live in remote areas and cannot travel long distances to attend schools and colleges, the government has provided hostel facilities. Other aids like incentive scholarships, financial assistance, books and cash prizes are also given to the students to promote education in the state. Karnataka, which is the seventh largest state in India and the ninth largest in terms of population, has a growing literacy rate. As per the 2011 census analysis, the literacy rate in Karnataka is 75.36%, which is better than the overall literacy rate of India at 74.04%. Nearly 82.47 % of males and 68.08% females living in Karnataka are literate. The literacy rate has increased in the state when compared to the census analysis of 2001. Earlier, the literacy rate in Karnataka was 67.04 %. The literacy rate of males was 76.29% and that of females was 57.45%.

Bengaluru, the capital of Karnataka, has high literacy rate of 87.67 percent which is second to the Dakshina Kannada district of Karnataka which has the highest literacy rate of 88.62 percent.

The total number of literates in Bengaluru district is 7,512,276 as per the census of 2011. The male literacy rate in the district is 91.01 percent while the female literacy rate is 84.01 percent.

The Chamarajnar district of Karnataka also has a low literacy rate of 61.12 percent, third only to Raichur and Yadgir district which have a literacy rate of 60.46 percent and 52.36 percent respectively.

As per reports of 2006, there are nearly 54,529 primary schools in the state with 252,875 teachers and 8.495 million students and 9,499 secondary schools with 92,287 teachers with 1.384 million students. Karnataka has 481-degree colleges which run under the state administration.

2.4 Situation on STEM in the study region

STEM education to be extended to more schools in Karnataka

The concept is to strengthen students by providing them with mentorship and allied activities including special coaching, soft-skill training and exposure to visit industries.



Figure 2.9: STEM education for girl students in Karnataka

The STEM (Science, Technology, Engineering and Medicine) education for girl students will now be extended to 99 more schools in the state. Currently, it exists in 50 schools across Bengaluru. The programme is set to be extended to schools located in Dharwad and Mysore, with 50 schools in Dharwad and 5 at Mysore.

This programme, conducted by the state department of primary and secondary education in association with Qualcomm, United Way and Swamy Vivekananda Youth Movement, provides girl students with skill-based education by giving them dedicated STEM labs at schools. The concept is to strengthen students by providing them with mentorship and allied activities including special coaching, soft-skill training and exposure to visit industries.

“This programme also helps us to create awareness about girl’s education and community engagement in creating awareness,” said an official from the department. To date, around 25,000 children have been educated and trained under this program, of which 40 per cent are girls. From this year, the programme will even give scholarships to girl students for their higher education.

2.5 Benefits for this study to the study region

Science literacy subsequently benefits individuals throughout their lives, from forming opinions about proposed government policies to making health-care decisions. A well-informed citizenry, in turn, pays dividends to society as a whole

Nurturing a support system for India’s women scientists



Figure 2.10: celebrating the contributions of women scientists to the field of science in Karnataka.

On National Science Day—a day to celebrate the spirit of science and scientific temper across the county. It is a day to commemorate Sir C V Raman’s discovery of the Raman effect. This year, the theme of National

Science Day is ‘Women in Science’, Figure 2.9: celebrating the contributions of women scientists to the field of science in India.

However, there is a bit of irony here, considering Sir Raman’s view of women and their ability to contribute to science. The good news, however, is that these noteworthy contributions of women scientists, in the past and the present, are now receiving recognition and appreciation.

In India, like everywhere else in the world, there is a gender gap in the number of men and women in science. The latest AISHE survey, by the Ministry of Human Resource and Development, found that about 48% of those enrolled in a PhD programme in science were women. While this number is heartening, these budding scientists need an ecosystem of support to realise their full potential and be successful in their careers as scientists. Such a support system is critical in increasing the representation of women and giving them a voice.

“Representation of women in all spheres is critical for success and growth and to maintain gender diversity and parity,” argues Dr Renu Swarup, Secretary, Department of Biotechnology, Government of India. In an interview with Research Matters, she points out that unless there is an equal representation by gender, we, as a country, will not be able to move ahead and achieve our desired goals. “Women, who constitute nearly 50% of the population, and are engaged in all fields, must have equal representation,” she states.

In reality, challenges galore is what we learnt

A recent study found glaring gaps between men and women in the authorship of scientific papers across the world [See image below]. Although this gap seems to be narrowing down over the years, there are miles to go. The same study also found that women give up their career in science much before men do because of other responsibilities.

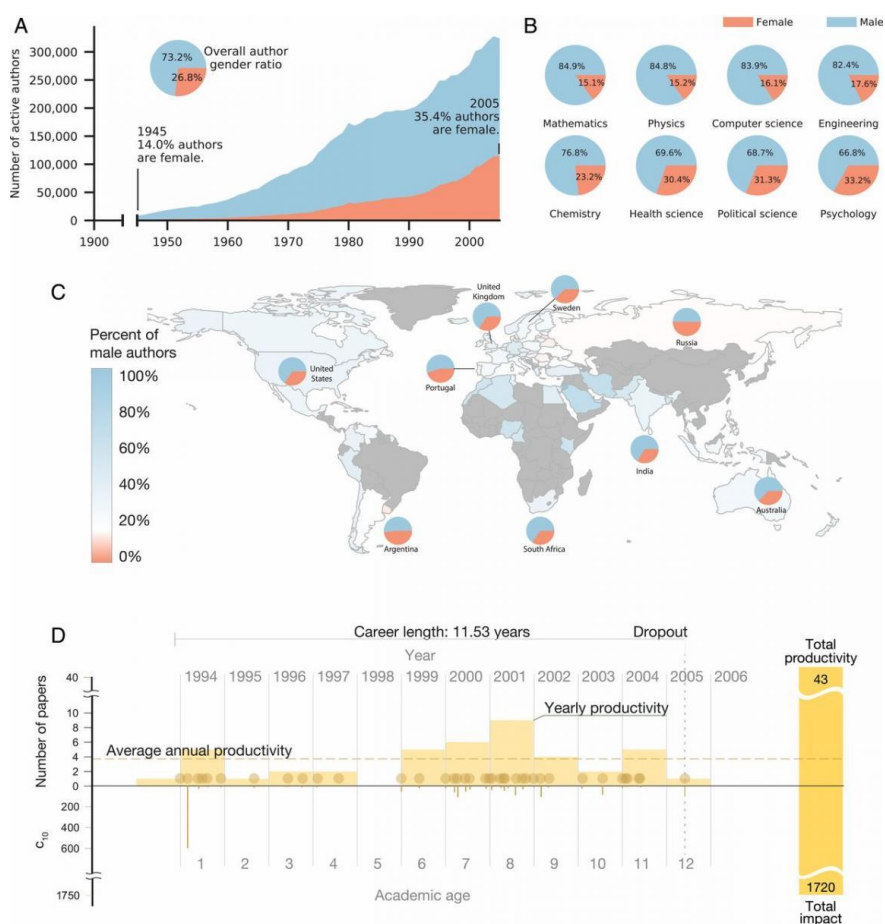


Figure 2.11: Gender imbalance since 1955

These findings are not too surprising, says Dr Gitanjali Yadav, Scientist at the National Institute of Plant Genome Research, New Delhi, and Lecturer at the University of Cambridge. In an interview with *Research Matters*, Dr Yadav shares some of her observations on what factors reduce the productivity of women in science.

“It is also becoming increasingly evident that women spend a disproportionate amount of time on academic housekeeping work when compared to their male counterparts,” she points out.

This ‘invisible’ work keeps the ladies perpetually busy, without adding to conventional ‘scientific productivity’.

Dr Kavita Isvaran, Associate Professor at the Indian Institute of Science, agrees with this view.

“In India, the representation of women in science institutions is already low. Besides, because of the ‘good-girl’ syndrome, women on average take up more work than men, which can substantially affect productivity and therefore, tenure and promotion,” she shares, talking to *Research Matters*.

There are other conspicuous barriers that can add to the disproportionate mental load for women. Safety is one such, says Dr Isvaran, as she recollects her days as a field ecologist travelling to remote jungles of India to carry out her work.

“The main challenge while doing fieldwork was always having to think very carefully about safety while planning fieldwork,” she points out. “As a PhD student, I travelled to 10-15 blackbuck populations across India, mostly by bus and train. I was very careful to plan my travel to minimise the chances of running into a tricky safety situation. It could be quite stressful at times, especially if the bus broke down in the middle of nowhere, and it was nearing the end of the day.”

Talking about fieldwork, Dr Jahnvi Joshi, Scientist at the CSIR-Centre for Cellular and Molecular Biology, provides a different perspective.

“There are other challenges of doing fieldwork—getting permits on time and managing logistics and field staff,” she shares.

Another commonly cited reason for women to step out of academia is the responsibility of caregiving.

“Managing work and family can occasionally be difficult,” says Dr Isvaran, a mother of two small children.

“When there are tight deadlines at work and children are sick, then meeting those deadlines can be tough.

Besides, when meetings are scheduled in the evening or on weekends, one needs to adjust family responsibilities to attend them, or miss out on participating in important meetings.”

For women, a break in their career is almost inevitable if they decide to have children. In a publish-or-perish world, this much-needed break could spell an end to some blossoming careers.

“Academic institutions should aim for a conducive and supportive work environment, where child-care facilities are available, and grants are targeted towards those on a break to get back to academics,” voices Dr Joshi.

Decisions on the evaluation and promotion of researchers should consider the period of maternity or paternity leave availed. However, the generous 6-month maternity leave may not be adequate.

“Women are very likely to experience reduced productivity in the months leading to birth and also after the baby is six months old. Factoring this into how productive we expect women scientists to be, without appearing patronising or conciliatory, can make a big difference,” opines Dr Isvaran.

Besides, there are institutional politics and gender-directed slander one has to overcome. Dr Anindita Bhadra, Associate Professor at the Indian Institute of Science Research and Education Kolkata (IISER Kolkata), [shares](#) some of her traumatic experiences dealing with such challenges, during her second pregnancy.

“Because the representation of women in science is still very low, a woman scientist frequently participates in committees where she may be the only woman. This can feel a little constraining or even sometimes intimidating and come in the way of contributing freely to the discussion,” adds Dr Isvaran.

Are such challenges specific to India?

“Most of the challenges faced by women in science are common across the globe,” says Dr Yadav. “Self-questioning, guilt and doubt, lack of self-confidence and the fear of combining an academic career with a family—these are everywhere,” she says.

However, when it comes to the debate on work-life balance, it is by default, the women who are judged. They are also more likely to experience the need, both perceived and experienced, to work harder and deliver a higher output to advance at the same rate as their male colleagues.

Finding ground and sailing through

In a maze of gender stereotypes and challenges, how do these women thread the slippery slope they are on? For Dr Isvaran, it is a handful of supportive colleagues who understand the needs of a woman scientist.

“My colleagues are immediately supportive when we have asked for evening and weekend meetings to be rescheduled,” she says, stressing on the need for sensitising these needs at the workplace. “Creating an environment that is supportive of a work-life balance is crucial, especially since, on average, women contribute to caregiving more than men.”

Networking among peers, through professional organisations, can provide a supporting ecosystem, says Dr Bhadra.

“Professional organisations can play multiple roles, including mentoring, networking and sometimes, funding. They also help to engage in science policy, administration and outreach, build leadership skills and increase the visibility of scientists,” she says.

Dr Bhadra is the Founding-Chairperson of the Indian National Young Academy of Science (INYAS), an initiative of the Indian National Science Academy (INSA). She is also a member of the Global Young Academy (GYA) and the Indian chapter of the Organisation of Women in Science for the Developing World (OWSD).

Talking about her experience at INYAS, Dr Bhadra says, “INYAS is an academy of young scientists, so we try to discuss the problems and concerns of young scientists and brainstorm together for solutions. We have made contact with funding organisations, and now, INYAS members will now be part of funding committees, which will help to give voice to young academicians to the funding agencies,” she explains.

“INYAS aspires to be the voice of young scientists across the country, fostering careers by providing new opportunities and regular platforms to exchange ideas, initiate discussions/collaborations among scientists across boundaries of traditional scientific disciplines”, adds Dr Yadav, who is a former member of the Core Committee at INYAS.

There are also various schemes and initiatives aimed at women from an administrative standpoint.

“The Department of Biotechnology (DBT) has made special efforts to encourage women scientists to pursue their research even after a career break. BioCARE is one such scheme which allows women researchers both employed and unemployed to take up research,” shares Dr Swarup. “We also have special awards to recognize excellence in research and innovation by women scientists, like the **Janaki Ammal-National Women Bioscientist Awards**,” she explains.

The Biotechnology Industry Research Assistance Council (BIRAC), a Public Enterprise under DBT, also supports women entrepreneurs.

“We have three incubators, which specially focus on women entrepreneurs and nearly 10%-15% of startups supported are by women. We also have a special challenge for women entrepreneurs to help them take entrepreneurship research forward and create enterprises,” details Dr Swarup.

The Department of Science and Technology (DST) and the Science and Engineering Research Board (SERB) have an array of schemes and awards to encourage women in science.

“This year, the SERB Women Excellence Award is being conferred to the recipients by the President of India. What greater morale booster can there be for women in science,” asks Dr Yadav.

Grooming role models, who can inspire more women to take up science as a career, are vital too. “A lack of role models can be very discouraging,” says Dr Isvaran, and Dr Yadav is quick to point out a few— “We do have fabulous role models in the DBT Secretary, the INSA President and our very own founding Chairperson of INYAS.” Dr Joshi also agrees, “Definitely, we need more women scientists in India,” she says.

But simple acts, like paying careful attention to the composition of a seminar series or a panel discussion or a committee, to ensure that gender diversity is represented, goes a long way in spreading the message. Initiatives like [Request a Woman Scientist](#) helps amplify the voice of women scientists by providing a database of women scientists who can be considered for different panels and committees.

“Bringing together women by organisations like INYAS, India Bioscience, GYA and others, reduces isolation, allows for sharing of experience, discussing common issues and ways to address them. Increasing their connections builds a strong platform for continuing future support,” says Dr Yadav.

The scene for women in Indian science is slowly but surely changing for the better, as evidenced by the increase in their enrollment. With many more vocal voices joining in, the road ahead is likely to be eventful for many. At this juncture, what women need is an environment that understands their specific needs, trusts them and supports them through testing times. Of course, words of encouragement have never hurt anyone!

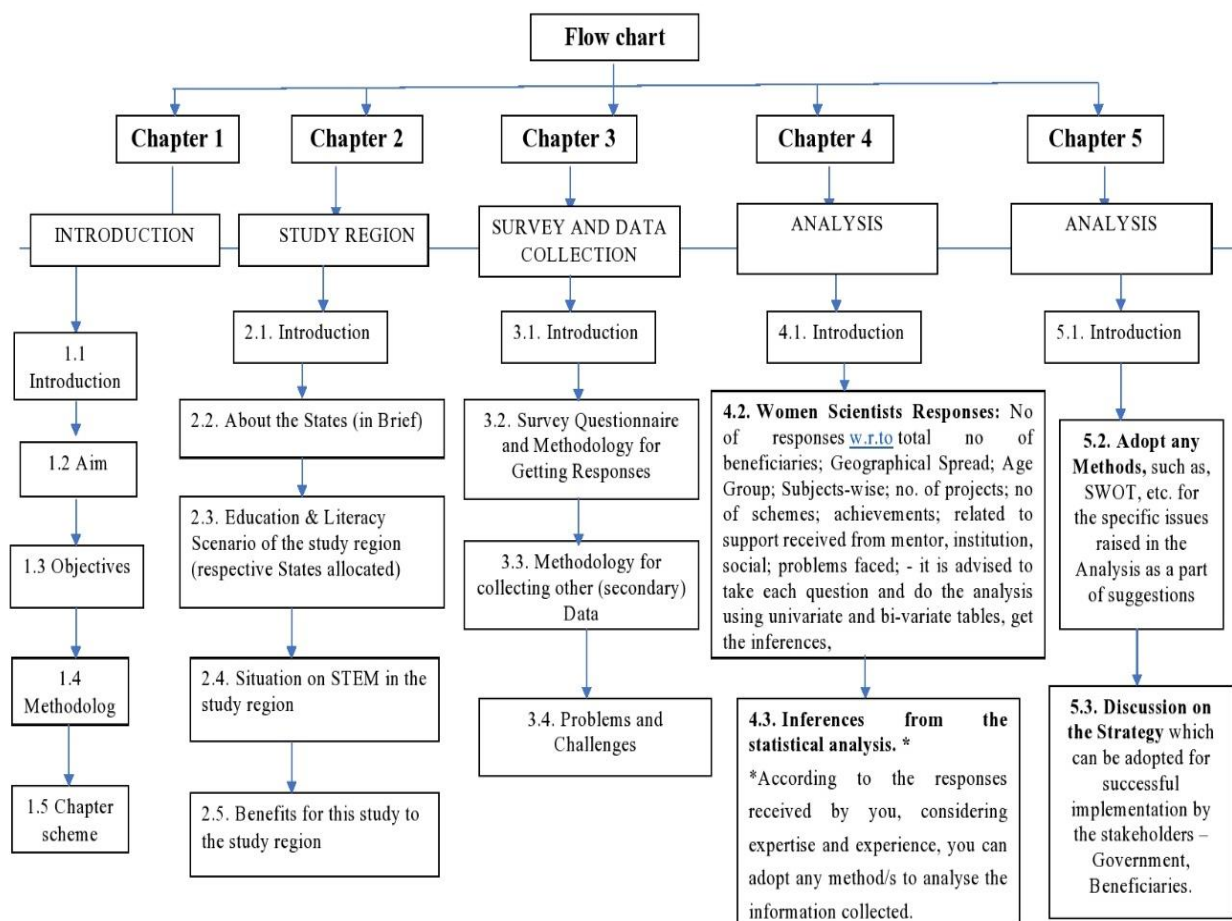
As Dr Swarup puts it— **“Never see anything as a failure and do not let that hold you back. Be confident of yourself, identify your strengths, and this will help you to attain great heights.”**

Chapter 3

Methodology-sampling design, data sources etc

Designing of the whole project is reflected in the scheme shown as a flow chart.

The scheme is as per the flow chart given below.



3. SURVEY AND DATA COLLECTION

3.1 Introduction

Gender mainstreaming is the process of bringing a gender perspective into the mainstream activities of Government at all levels, including policies, programs and projects. The current project has been a means of promoting the role of women in the field of science and technology and of integrating women's values into development work in scientific research. By bringing women's issues into their mainstream policies, programs and projects, it is hoped that earlier problems of marginalization would be overcome. Gender mainstreaming builds on the knowledge and lessons learnt from previous

experiences with gender equality policies. Specific gender mainstreaming to bring women with scientific career break back to an active research career is a strategy that directly addresses women issues for the break by taking into account the specific commitments of women and elaborating policies to meet these needs. This accelerates and strengthens the process of transforming life of women scientists in the direction of better vision of their interest in scientific career. We intend to address issues in the mainstream of science and technology policy. The main focus has been on ‘integrating’ Women, or adding women in, through increasing the number of women scientists and policy makers. However, this often meets the discouraging reality that, once inside the system, many highly skilled women opt out. Recruitment, retention and promotion of women in science and technology careers and decision -making roles is the starting point to witness women empowerment. Women should be able to reap the benefits of their own fine tuning in science and technology- based skills and knowledge.

3.2 Survey Questionnaire and Methodology for Getting Responses

The survey questionnaire or also called as Survey Form, consisted of four sections A, B, C and D. The section A pertains to collection of profile of the Principal Investigator. To be called as Principal Investigators will per se drive the beneficiary women scientists to bear the responsibility of handling the research project funded by respective agencies and completing the same with meaningful conclusion. Section B reflects on the Project Profile. Details of Title, funding agency, place where the project will be executed, co-investigators if any, nature and type of the project where in specific area, collaboration and period of project duration are provided by the beneficiary. Section C mainly indicates about the financial implications of the project. Total project cost sanctioned by funding agency, Budget released and expenditure under different heads such as recurring, non-recurring, man power etc. Accountability criteria includes providing utilization certificate and statement of expenditure by the women scientists. The output of research project is evaluated in section D. Productivity reflectors such as research papers published, books published, contribution to book chapters, patents if any, industry collaborations leading to product or process development are the major parameters assessed. Survey data constitutes the resultant data that was collected from women scientist- respondents that took

survey. This data is comprehensive information gathered from a target women scientist about several aspects pertaining to basic information to research impact. There are many methods that were used for survey data collection and statistical analysis.

3.3 Methodology for collecting other (secondary) Data

Various mediums were used to collect feedback and opinions from the women scientists. It was preferred to gather data from multiple sources such as online surveys, telephonic surveys, face-to-face surveys, etc. The medium of collecting survey data was with an intention to reach out to, the requisite number of survey responses.

Factors of collecting survey data such as how the principal investigator interviewer will contact the women scientists (online or offline), how the information is communicated to the respondents etc. decided the effectiveness of gathered data.

The methods used to collect survey data have involved face-to-face surveys, telephonic surveys, online and email surveys. Each survey data collection method has its pros and cons, and we had a preference for gathering accurate information from the target sample.

The online survey form being the main source for data collection, the information and secondary data collection included approaches to dig role of mentor, family and friends, peer group, opportunities arising during the journey of the stake holder in project time.

Initially the email id's of all the women scientists were collected. This information was provided by CEPT for Karnataka region.

Women scientists were contacted by the following methods in order to efficiently collect the duly filled survey form. Candidates were instructed over email as follows:

Dear Woman Scientist,

Please find attached the required introduction and instruction to fill the on-line survey form with respect to your WOS A project. A letter from DST is also attached. Use the link below to access the on-line survey form. Hard copy of the form is also provided. Pl. upload/ send the filled forms on or before 29th May 2019.

In case you have had 2 projects use questionnaire project 2.

Thanking you,

Prof. Bharathi Salimath

Survey team PI

Ph:9972969705

A link of the form is: <https://arcg.is/158nav>

Please use the link as above to access the on-line survey form.

Let me know once you have uploaded the form.

Thanking you,

Prof. Bharathi Salimath

Survey team PI, Ph:9972969705

Chapter 4: Detailed Analysis of the Data

Methods used to collect survey data:

A total of 180 women scientists were awarded extra mural funding between 2012 to 2016. From the data supplied by CEPT there was no email id or any other contact information for 29 candidates. There were 15 emails that bounced. Some of the survey points were repeated

Survey and awardee communications	No. of awardee
Total number awarded with funding	180
BOUNCED e mails	15
NO email id	29
CANDIDATES APPROACHED	136
Survey points received	98
Survey points repeated	12
No. of survey points replied	86

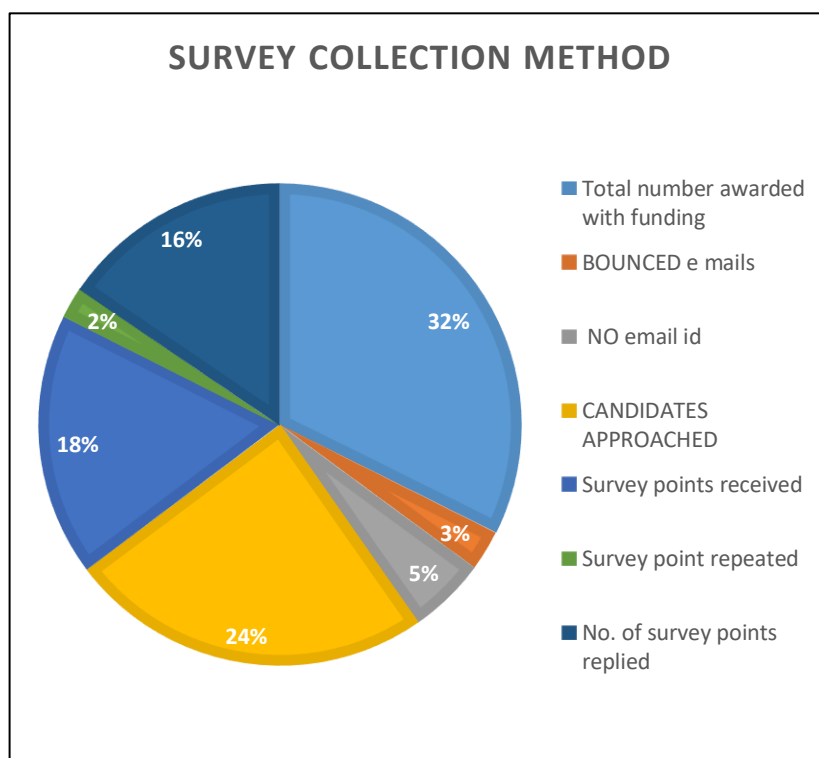


Table 3.1 and Figure 3.1: Methods used to collect data from women scientists through survey questionnaire

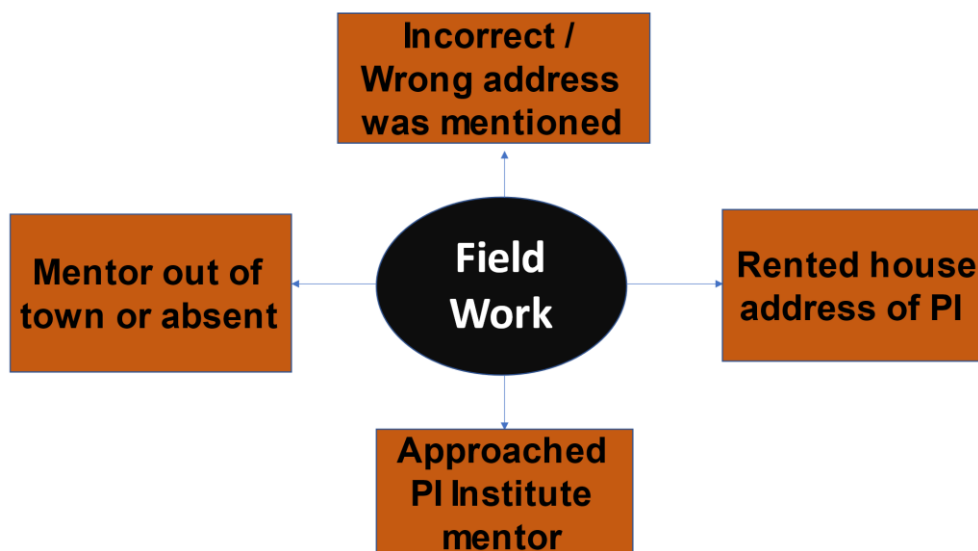
Midterm data presentation by women scientists augmented data collection. Employment gain, placements, further funding opportunities post-project shows a win-win situation. Recording success stories as video and short write-up of the best performers boosted the aspirations of the stake holders.

3.4 Problems and Challenges

The following were the problems or issues faced during data collection from the women scientists with email id issues either with bounced mail id or no email id:

- a. Incorrect or wrong address of the women scientists hindered contacting them by visiting. These candidates did not give their email id.
- b. Change of house address was not intimated to DST. As a result, direct contact could not be established with the women scientists.
- c. We tried to contact the mentor with whom the women scientists worked or the mentor institution where mentor was no more working in that institute.

Challenges / Problems / Issues



Problem wise Solution / Action taken

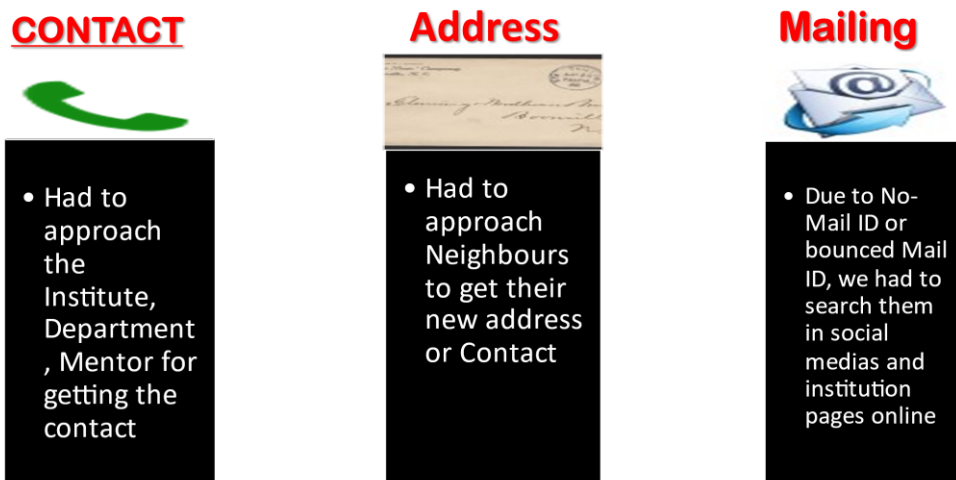


Figure 3.2: Data showing problems faced during data collection from women scientists by the principal investigator

Break in career:

Out of the 86 respondents to the survey questionnaire, 79 women scientists had a break in career before getting back to the mainstream of research.

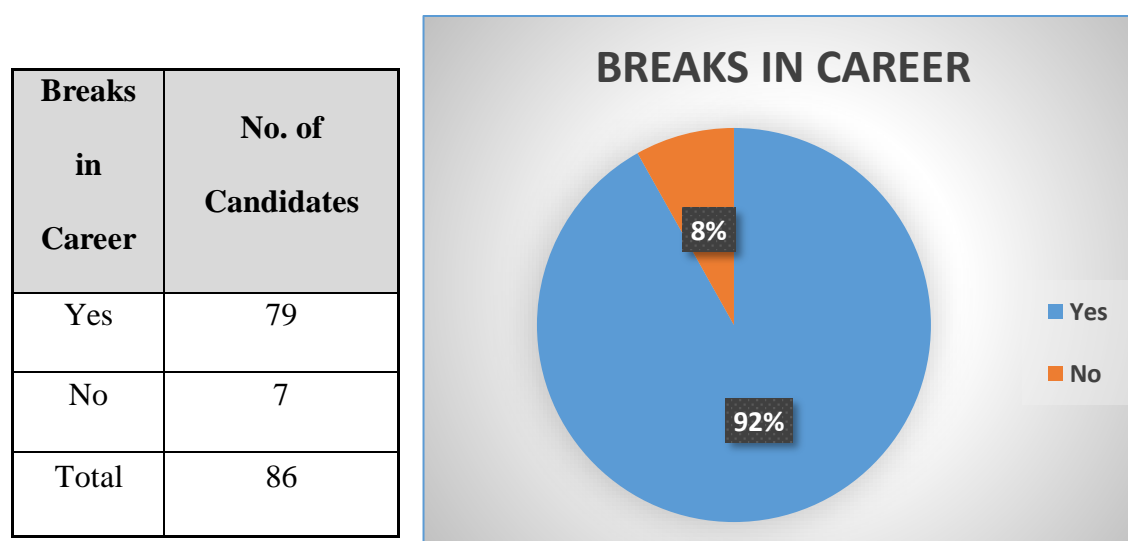
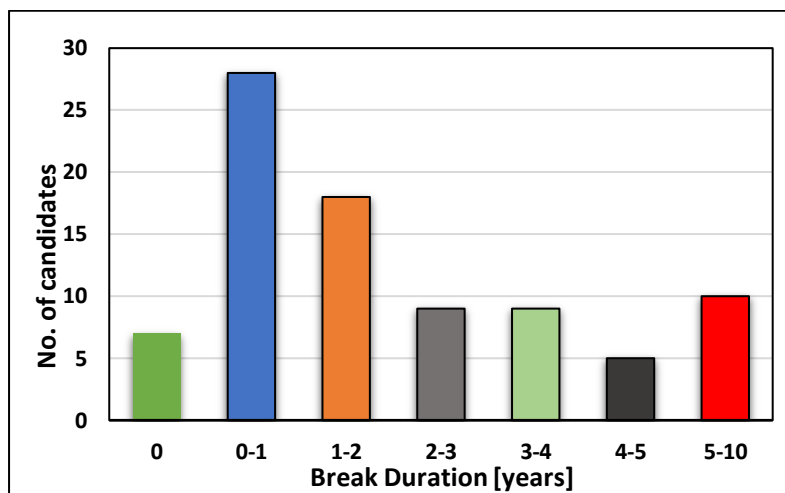


Table 3.3 and Figure 3.3: Women scientists with break in career who were awarded with research grant

The break in career is very prevalent among women scientists in India. Giving them opportunities and making them come back to research career has had tremendous impact for gender mainstreaming. The break in career has been either short term for a year or two, or has been for a longer time period of five to ten years.

Break Duration (in years)	No. of Candidates
0	7
0-1	28
1-2	18
2-3	9
3-4	9
4-5	5
5-10	10
Total	86

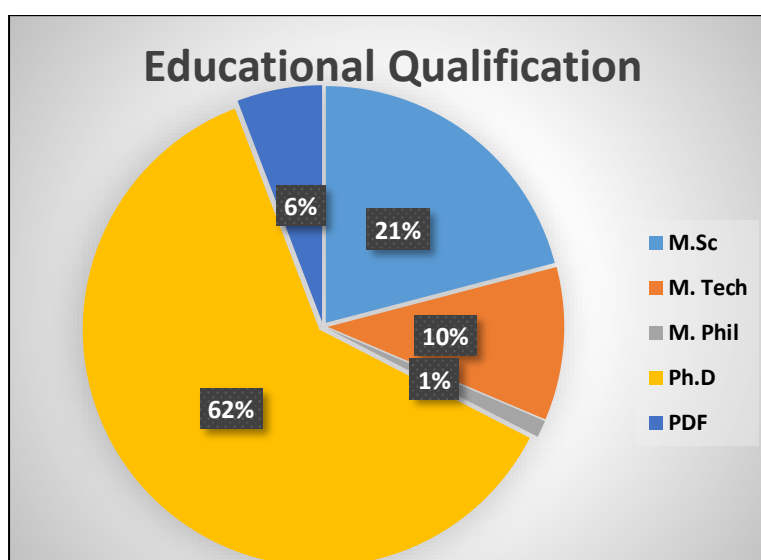


Table

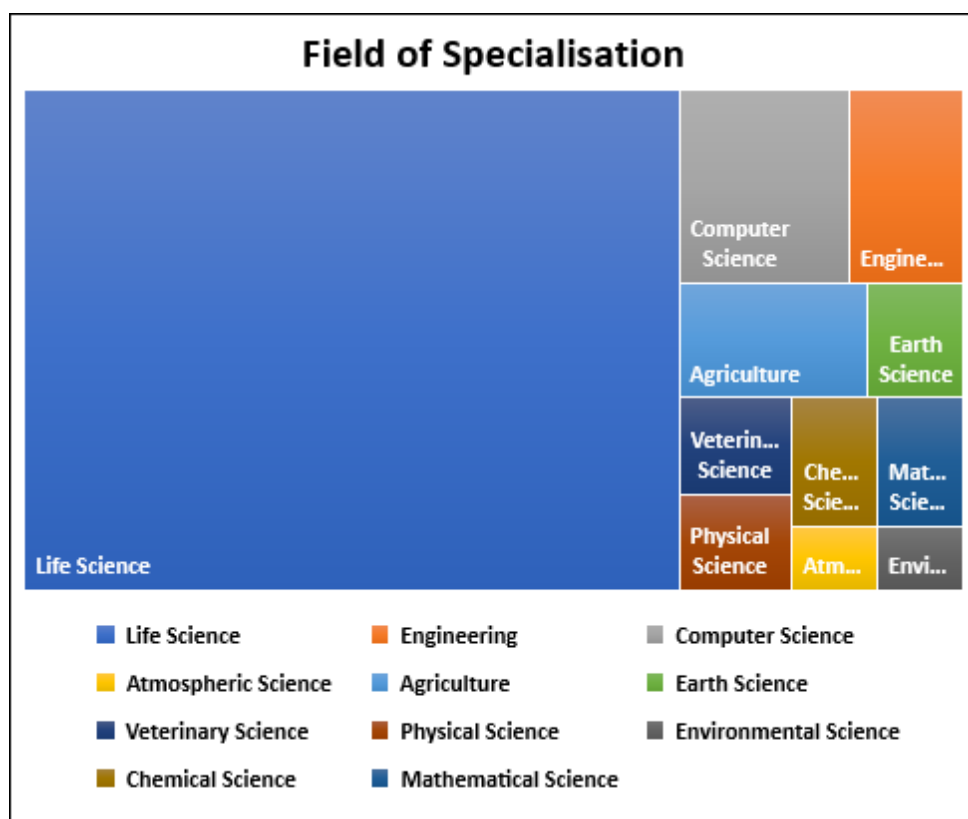
3.4 and Figure 3.4: The duration of break women scientists have had prior to availing the grant

Table 3.5 and Figure 3.5: Educational Qualification of Women Scientists at the Time of availing the Schemes:

Educational qualifications	No. of Candidates
M.Sc	18
M. Tech	9
M. Phil	1
Ph.D	53
PDF	5
Total	86



Maximum number of women scientists had PhD degree while undertaking the projects during the coming back to their career after a break due to mainly family reasons.



Field of specialisation	No. of Candidates
Life Science	60
Engineering	4
Computer Science	6
Atmospheric Science	1
Agriculture	4
Earth Science	2
Veterinary Science	2
Physical Science	2
Environmental Science	1
Chemical Science	2
Mathematical Science	2
Total	86

Table 3.6 and Figure 3.6: Field of Specialization of Women Scientists

Data clearly indicates that women in life sciences stream have availed maximum number of projects.

Women scientists with an age group between 25 to 35 years of

Age group in years [on date of project awarded]	No. of Awardee
25-35	53
35-45	29
45-55	4
Total	86

age are the maximum number of awardees. The age group between 35 to 45 years follow the younger group. This data clearly reflects the age in which women are indulged in

either marriage, child birth or other responsibilities towards taking care of their family commitments.

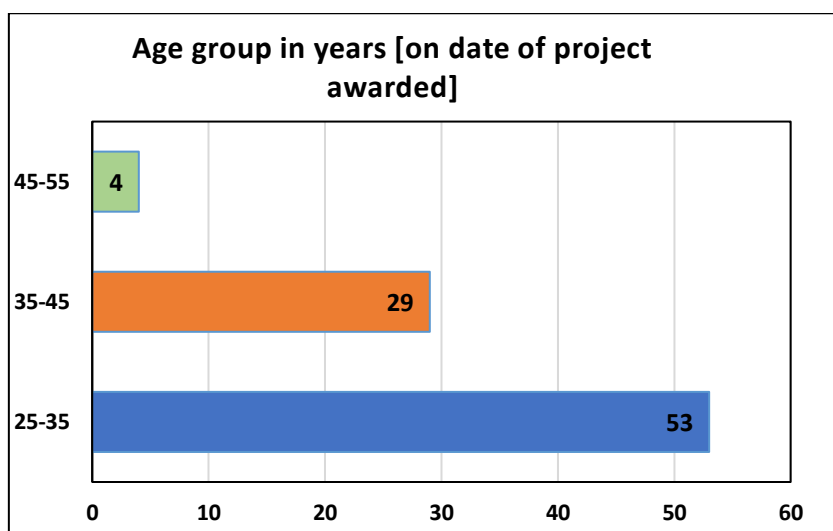


Table 3.7 and Figure 3.7: Age of women scientists on date of project being awarded

Skill development and training programs/workshop attended by women scientist

While these challenges were appropriately addressed, some women scientists/mentors per se have availed skilling hands on training workshop in the field of their interest. The following figures indicate the hands-on training/skill development workshop that we conducted, the experiments we did to conduct the training and the certificate(eg.) we have issued to the participants.



Figure 3.8: Skill development hands-on training workshop attended by women scientists

Table 3.8: NSTMIS: Skill development Training for women scientists/mentors

S. NO	Experiment	Page. No.
1	Mammalian cell culture maintenance including: Media preparation Subculturing adherent cells Freezing of cultured cells Thawing and revival of frozen cells Cell counting	2 3 4 5
2	Trypan blue exclusion method	6
3	Cell proliferation Assay by Resazurin	7
4	MTT Assay	8
5	Cell Migration Assay	9
6	Preparation of cell lysate	10
7	Western Blot/ Immunoblot analysis	11
8	Preparation of starter culture	12
9	Preparation of bulk culture	13
10	Preparation of competent cells	13
11	Transformation	14
12	Plasmid Isolation and downstream processing	17
13	Normalization of protein concentration	24
14	Preparation of SDS PAGE	26
15	Purified recombinant protein verification by SDS-PAGE	29

Chapter 5: Results and Discussion

4.1 Introduction

The following table and figure depict the year wise sanction of projects to the women scientists by DST, GOI.

Year	No. of Projects
2003	1
2004	1
2005	1
2006	3
2007	0
2008	1
2009	1
2010	3
2011	4
2012	9
2013	15
2014	15
2015	7
2016	19
2017	1
2018	2
2019	3
Total	86

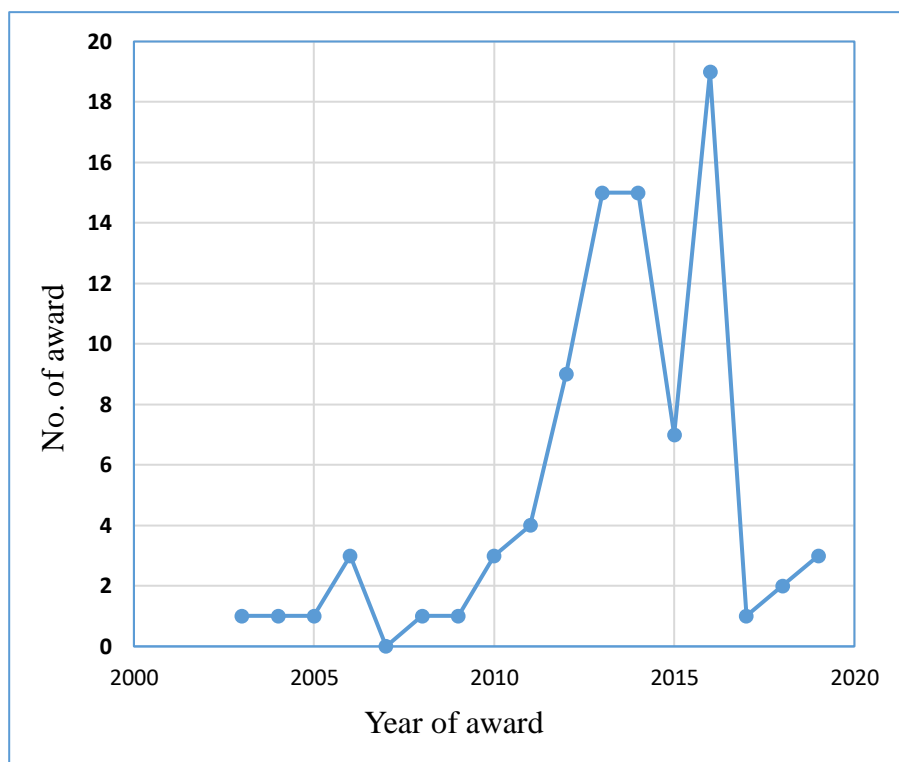


Table 4. 1 and Figure 4.1 Number of projects awarded to women scientists between 2003 to 2019

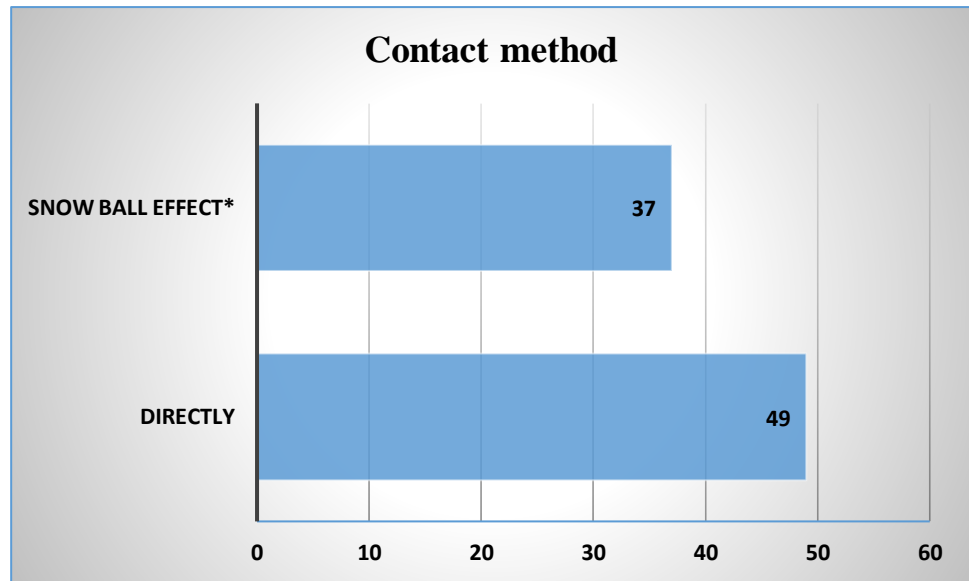
Maximum number of projects were sanctioned between 2010 to 2016.

Data Analysis:

After the survey data has been collected, this data was analyzed to ensure it aids towards the end research objective. There are different ways of conducting this research and some steps to follow. They are as below:

While direct method of contact was effective, we were not able to reach out to many candidates due to the draw backs such as mentioned earlier.

Contact method	Number
Directly	49
Snow ball effect*	37
Total	86



SNOW BALL EFFECT

Table 4.2 and Figure 4.2 Snow ball effect on collection of responses from women scientists

4.2 Women Scientists Responses

According to the data collected from the women scientists, following are the statistical data analysis of various indicators chosen for impact assessment of women scientists.

- Cross-tabulation: Cross-tabulation method was used for data analysis. We have used a a basic tabulation framework to make sense of data. This statistical analysis method helped to tabulate data into easily understandable rows and columns, and this helps draw parallels between different parameters. It contains data that is mutually exclusive or have some connection with each other. The data are further converted to histograms.

a. Institution affiliation analysis:

From the data collected from the women scientists, the statistical data of institution affiliation analysis indicates that for Karnataka region the representation of women scientists in state institutes is higher than in state universities. The data clearly indicates that the women scientists chose 12 different host institutions in the state. The maximum number (65%) of women scientists are working in Bangalore.

City of host institute	No. of candidates	% of candidates
Bangalore	55.00	63.95
Mysore	15.00	17.44
Belagavi	3.00	3.49
Mangalore	3.00	3.49
Manipal	2.00	2.33
Shivamogga	2.00	2.33
Tumakuru	1.00	1.16
Hassan	1.00	1.16
Raichur	1.00	1.16
Dharwad	1.00	1.16
Gokak	1.00	1.16
Bellary	1.00	1.16
Total	86.00	100.00

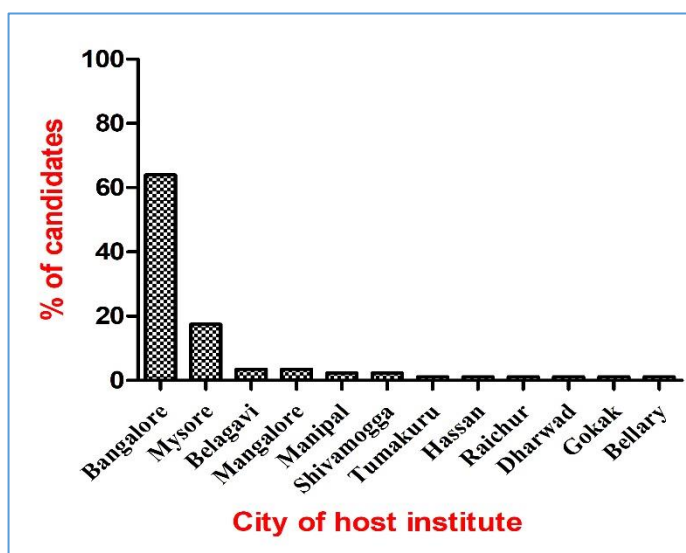
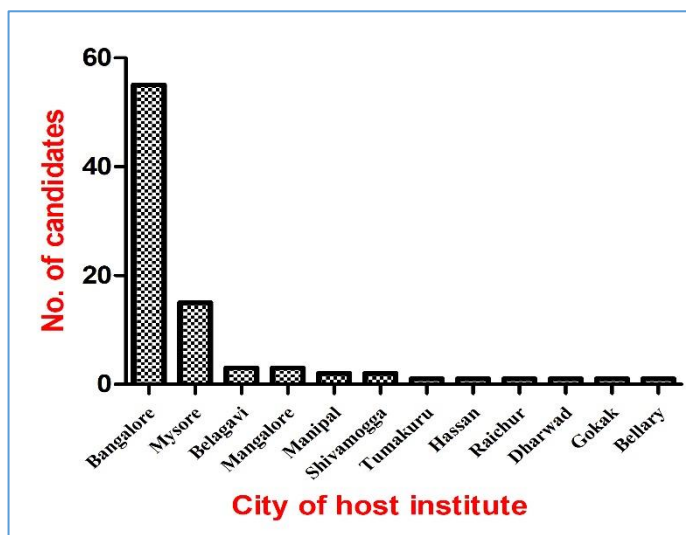


Table 4.3 and Figure 4.3: Host institutes in various cities of Karnataka chosen by women scientists

Data showing total number of candidates and percentage (Bangalore institutes accommodates highest percentage of the candidates = 63.95 % as shown in the representative graph.

b. Category wise analysis: The percentage of women scientist in various categories across various schemes is observed from the data collected. The statistical data of category wise representation of women scientists in STEM area indicates that highest representation of women scientists is under general category.

Therefore, it is suggested that SC and ST participation of women scientists may be encouraged and the data suggests the possibility for developing special schemes for SC & ST category of women scientist.

Category	No. of Candidates
General	72
OBC	10
SC	1
ST	2
PH	1
Total	86

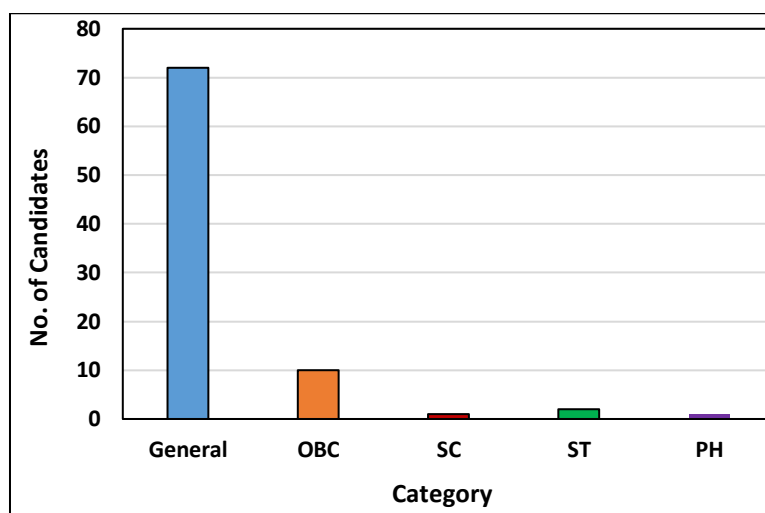


Table 4.4 and Figure 4.4: Category of women scientists who have worked under different schemes.

Women scientists under general merit are maximum in number to avail funding from various schemes.

c. Scheme wise representation analysis: The statistical analysis of scheme wise representation of Women scientists in STEM indicates that the maximum number of women scientists are noted under DST-WOS A scheme, indicating the successes of the program, benefiting women scientist largely with break in career. The number of women scientists in both in DST-WOS B and DST-WOS C scheme is very less. Likewise, the number of candidates in other schemes such as BioCare etc. was low. It is the R and D nature of the WOS A scheme which is attracting huge number of women scientists with a break in career. Their interest to come back to the main stream of research is evident from the survey data.

When compared to the huge number of applications for WOS A scheme, the success rate is approximately 25 to 30%.

Data showing award of various agencies that have awarded research projects to women scientists. Data indicates the total number and the percentage of the projects awarded. WOSA Scheme has been awarded to highest number/ percentage of the candidates = 79.07 %

Project/ Scheme	No. of candidates	% of candidates
WOSA	68.00	79.07
WOSB	7.00	8.14
Bio-care	6.00	6.98
WOSC	2.00	2.33
DBT	1.00	1.16
DST/Kiran	1.00	1.16
UGC-PDF	1.00	1.16
Total	86.00	100.00

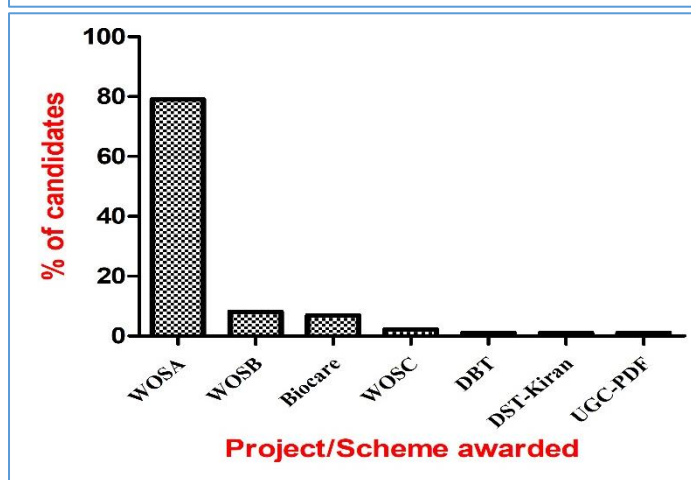
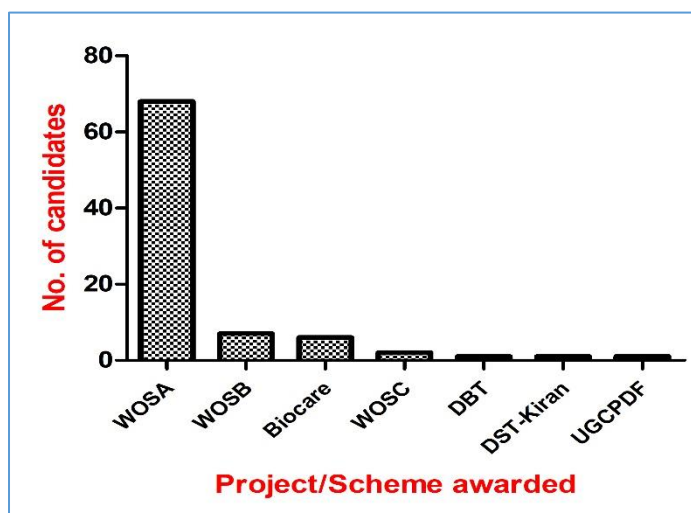


Table 4.5 and Figure 4.5 : Women scientists avail different research funding schemes to come back to mainstream if research

Survey and awardee communications	No. of awardee
Total number awarded with funding	180
BOUNCED e mails	15
NO email id	29
CANDIDATES APPROACHED	136
Survey points received	98
Survey points repeated	12
No. of survey points replied	86

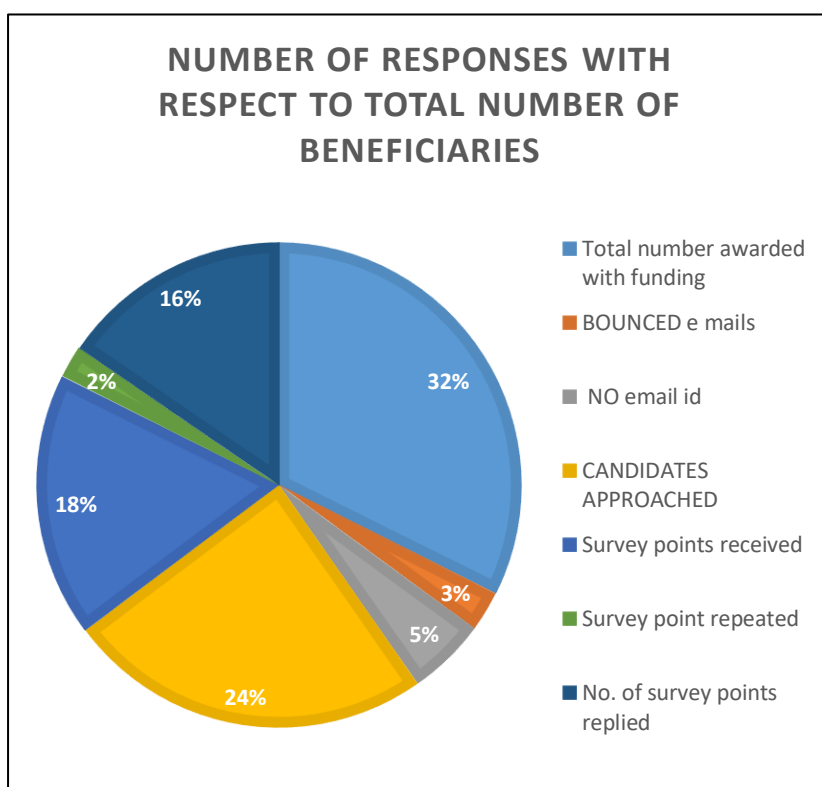
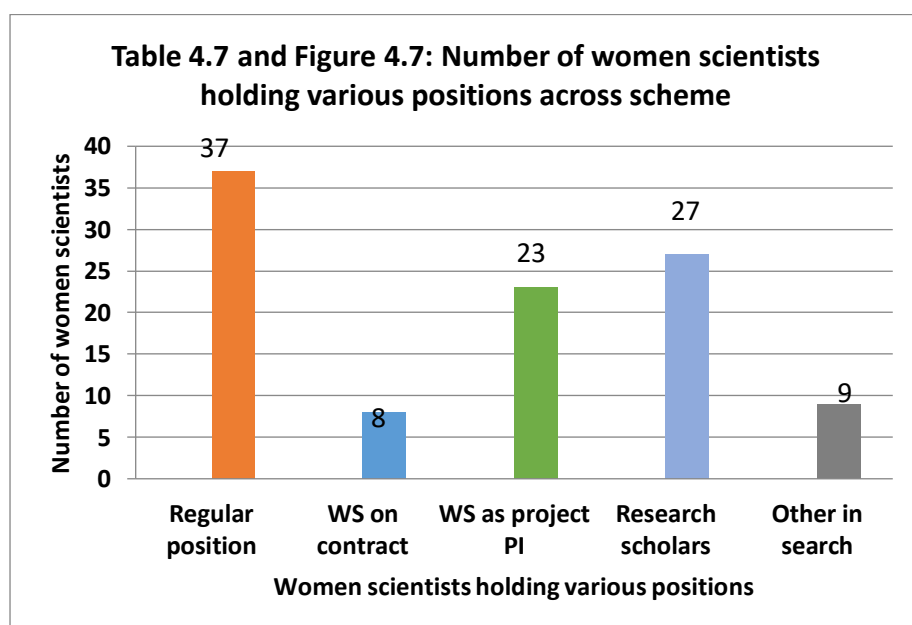


Table 4.6 and Figure 4.6: Number of responses with respect to total number of beneficiaries

Current Positions in various institution analyses: The percentage of current position of women scientists in STEM who are holding various positions in different institutions across various schemes is shown. The following details indicate the information of current positions of women scientists at different types of institutions across the state.

- a. **Women scientists who are hold regular positions:** These women scientists are placed as regular Scientists in R&D Institutes both in State and Central Govt Institutions, Assistant Professors grading to Professors & Head of Departments in Government/Aided Colleges and University Departments, Director of their own startups & Educational Institutions and as Scientists in SIROS registered with DSIR & in Industry. None of WS in DST- WOS B & WOS-C are placed in regular position.
- b. **Women scientists–On Contract-** These women scientists who are holding PhD degrees after completing or discontinuing the DST-WOS-A are primarily working as Programme Scientist, Project Scientist, faculty/teaching in charge, Patent Consultant, Research Officer.



- c. **Women scientists–as Project PI-** These women scientists who are holding PhD degrees are serving as principal investigators of the respective schemes like WOS-A, WOS-B, UGC –PDF and DBT-Biocare.
- d. **Women scientists as - Research Scholars-** These women scientists who are

holding either M.Sc or M.Phil or MTech degrees are working as research scholars in DST-WOS-A program mainly at University Depts, Private-Deemed University, R&D Institutions (State, Central), IISER, CSIR and ICAR Institutes Scientist at University Departments within the state.

- **Text analysis:** Text analysis in the questionnaire was used to make sense of and quantify or qualitative and open-ended data into easily understandable data

Data indicates that women scientists have actively published several research papers and participated in symposium and conferences. Awards have been won. . Hands on training programme and skill development activities have been taken up by the women scientists. Review articles have been published.

Scientific achievements	No.
Awards	3
Publications	63
Seminars/conferences	62
Workshops/Skill development	14
Review articles	63

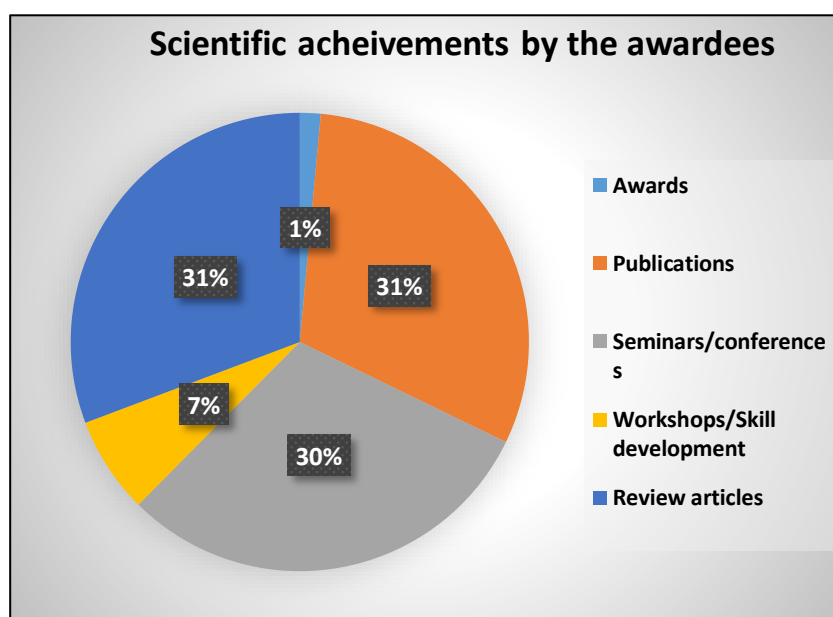


Table 4.8 and Figure 4.8: Scientific achievements by women scientists

Table 4.9: List of candidates short listed with good performance

	NAME	Survey point	No of publications	Email address	Current position
1	Pooja patravali	336	5	pcdongare@gmail.com	Research Scholar
2	Sheela M L	404 Principal Scientist and Section Head	1	sheeluml@yahoo.com	Principlescientist and section head Clinical Diagnostics
3	Kavyshree R	415	3	cavyarun@gmail.com	Associate Professor
4	Uma hiremath	428	5	hiremath@cens.res.in	Research
5	Harini santhanam	430	2	ecoharini@gmail.com	Postdoctoral Fellow
6	Pournamy Sukumaran	431	3	spournamy@gmail.com	project investigator
7	Niki swetha Jha	436	2	niki.swetajha@gmail.com	Assistant professor, Grade 1
8	PRATHIMA IENGAR	437	4	prathimaiengar@ncbs.res.in	Research Scientist and Principal Investigator
	Sushma appaiah	446	1	sushappaiah@gmail.com	Nutrition consultant, Founder and owner of Personalized Nutrition counseling firm, Golz (Giggles of Livez)
10	Deepika Togarichetu	454	5	sastry.deepi@gmail.com	Principal Investigator
11	Sangeetha kannan	456	2	k26sangeetha@gmail.com	Assistant Professor
12	Bhagya N	465	5	bhagya_tech123@rediffmail.com	Scientific Officer (Assistant Professor Stage I)
13	Vinaya rani gowda	468	4	vinayagowd@gmail.com	Clinical Research Investigator

14	Hemalatha M S	499	4	drmshemap@gmail.com	Assistant Professor and Chairperson
15	Elizabeth Frank	551	5	anet21frank@gmail.com	lead lab partner
16	Vandana yadav	583	5	vjshakti@yahoo.co.in	Guest lecturer
17	Merin mariama thomas	585	4	merinmariamthomas@gmail.com	Assistant professor
18	Ganga periyasamy	586	5	ganga.periyasamy@gmail.com	UGC-Assistant Professor
19	Nandini Chilkunda	602	1	cdnandini@cftri.res.in	Principal Scientist, Group leader
20	Nidhi malviya	629	3	nidhi.malviya7@gmail.com	Assistant Professor
21	Maya Mathew	668	5	mayastephen@gmail.com	Senior Scientific writer, Indegene, Part of Global Medical information team for Immunology for Astrazeneca
22	Radha cheruppanpullil		5	radha@cftri.res.in	Senior Technical Officer (3)

Five candidates were selected based on merit of the project performance and outcome to be projected/showcased as success stories. Both video and short write up was procured by these candidates. A standard format for narration of their success story and write up was used for this purpose.

SUCCESS STORY

Example: Dr. Parul Saxena has completed her Ph.D. in year 2000 in ... discipline

She is currently working on position in ... institution on ... designation.

She is a proud mother & wife with 2 children.

Dr. Kavyashree. R was born in Mysore, the cultural capital of Karnataka in the

year 1972. She has obtained both Bachelor & Master Degree from Mysore

University and Doctoral degree from Bangalore University in 2002.



She started her career at Central Food Technological Research Institute (CFTRI)

Mysore in 1996 and served Bangalore University from 2003 at various

positions like Guest Faculty, Principal Investigator (DST WOS-A) & Research

Associate (DBT). In 2011 she was awarded with Jnana Fellow, Karnataka

*Recipient of WOS-A
FELLOWSHIP between
2005-2008 & Batch III*

Jnana Aayoga (Karnataka Knowledge Commission) GoK. Subsequently

Dr. Kavyashree gained the expertise and leadership skills necessary to

successfully carry out the proposed research projects and manage other responsible positions. She is

currently serving as Principal, Professor & Head, Department of Biotechnology, The Oxford College of

Science, Bengaluru. Her administration skills has been appreciated and has accepted other challenging

positions like Co-ordinator in Biotechnology Skill Enhancement Program–BiSEP, Co-ordinator (In-charge)

in Department of Molecular Biology, Bangalore University, Executive Council Member in Society of

Cytologists & Geneticists, Bengaluru, Monitoring-cum-Steering Committee Member for implementation

of BiSEP, K Tech, GoK, Member – Academic Advisory Committee UGC-HRDC, Bangalore University

and Sectional President-New Biology Section in 108th Indian Science Congress.

Prof. Kavyashree has 24 years of research and 19 years of teaching experience. She has 36 papers published

in national/International journals, 33 conferences attended, two books published & 16

conferences/meetings organized. An immense research accomplishment has showered her with various

prestigious awards like Prof. R. P. Roy Prize at the “Eighth All India Conference on Cytology and Genetics”, 2001; Fellow of Society of Sciences (F.S.Sc.) by Society of Sciences, India, 2004; Fellow of Society of Applied Biotechnologists (FSAB) by Society of Applied Biotechnologists, 2010; Jnana Fellow by Karnataka Knowledge Commission, GoK, 2011; SMYSR Award by VGST, Department of IT, BT, S&T, GoK, 2011; Young Scientist Award for contributions made in the field of medicinal Plant Biotechnology at “3rd International Conference on medicinal Plants & Herbal products” organised by Faculty of Medicine and the Institute of Indigenous medicine, University of Colombo, Colombo, 2011; Honorary Doctorate by Dr.Radhakrishnan Research and Development Centre, University of South America in 2016.

Dr. Kavyashree. R has also contributed to the field of R&D by serving as Principal Investigator and co Investigator in various Research / Infrastructure Development projects funded by DST, GoI; UGC, New Delhi; KSCST, GoK; VGST, K-Tech, Department of IT, BT, S&T, GoK; Karnataka Jnana Aayoga, GoK. She has also served as Scientist Mentor for DST WOS-A project. She is a lifetime member of various professional bodies includes Society of Cytologists and Geneticists, Society of Plant Cell Biotechnology & Molecular Biology, Society of Sciences, International Society of Plant Morphologists, The Indian Science Congress Association, Society of Applied Biotechnologists. Currently, she is also serving as a reviewer and editor for various national and international journals.

How was the academic & professional life of the beneficiary before joining the scheme?

Example: Before being awarded with the project, I was staying at home after my second baby was born. Although, I had my Ph.D. degree, I was just taking care of my child and I had no professional carrier....

I had taken a break in my career after completing my Ph.D degree to take care of my new born child. I was unable to take up full time assignment during that period. Thereafter, I was fortunate to learn about the scheme and succeeded in procuring the research grant in second attempt.

How did the beneficiary got to know about this scheme

Example: I heard about this scheme through internet/friend/social media....

I learnt about the scheme through a notification in Current Science journal.

How did you got passion to pursue career in STEM

During PUC I used to be fascinated by various scientific instruments in the college laboratory. To reach my college I used to walk through Manasa Gangotri campus at Mysore where I would get to watch students and research scholars performing variety of experiments in well equipped labs. Seeing them, I would always feel that I should also get into one of the renowned labs and carry out original research activities. Moreover, Science has always triggered a curiosity in me as science is a field full of innovation and creativity.

How the scheme has helped the beneficiary to get back on the track after career break

When I applied for this scheme, I was not expecting that things will move in such a positive and forward manner for me after all these years of break... The interview was conducted in.... And the whole process was very smooth...

I always had passion towards research which became stronger while doing Ph.D. I was very well groomed by my Guide in writing research articles, research proposals and presenting in conferences that fetched awards and recognition. Hence, career break post Ph.D made it difficult for me to get back to permanent appointment or apply for research grants open to all. The WoS-A scheme focused on women who had a break in career was a blessing in disguise for me as I was aspiring to get back to the research field. This scheme provided a platform for me to work in a recognized University independently, update my skills, learn to manage finance, learn to manage work-life balance and helped in developing confidence and self-esteem.

Rewards/Awards/achievements received during the scheme

During the scheme I have attended many Technology conferences which were so informative and inspiring... I have developed this project during the scheme.... I have published n number of papers in Conferences & journals...

While pursuing research under the WOS-A scheme, I have published 17 papers in national and international journals of which 5 related to project work, have presented papers in 2 international and 7 national conferences. I have submitted 3 research proposals to DST, GoI under Swarnajayanthi, BOYSCAT & IUSTF fellowship scheme. I have also served as Organizing committee member of “1st & 7th meeting of the Subject Expert Committee (SEC) on Life Sciences Women Scientists Scheme – A(WOS-A).

Critical Skills developed during the scheme

Example: During WOS-A, I have developed Programming skills, software development, mathematical modelling etc

During the scheme, I have developed skills for molecular cloning and characterization.

Impact of Fellowship/Internship of the scheme on

- Professional life

Example: I am teaching in a reputed university and have also guided number of students for M.Tech./Ph.D. dissertations. I am also carrying out research in the emerging field of Climate Change science and wrote research papers in peer review National/International journals.

The scheme provided a solid platform to pursue a career in teaching and research. Presently, I am heading a well known Science college in Bengaluru with 13 UG/PG departments and more than

4000 students. I teach PG students of Biotechnology and my area of research is molecular characterization and transformation studies. I have handled 6 projects by receiving grants from various funding agencies, have guided 26 M.Sc., projects, have mentored one WOS-A, one SPiCE and KSCST project, have published research articles in peer reviewed national and international journals, have authored 2 books, 1 book chapter and have received 7 awards/fellowships. My contributions have been well recognised and I have been nominated as member of several professional and academic bodies.

Family front

Example: Earlier I was not able to support my family financially. Now not only I have sufficient economic standing, the love and passion for science is inspiring me to give my children the same education I got...

My family members are delighted to note that the knowledge I have acquired on completion of Ph.D have been put to effective use in teaching and research field. Given my accomplishments I have become a role model to many members of my extended family.

- Personal Front

I see myself as an eminent researcher and member of scientific community now...

I see myself as a very confident personality with ability to source, co-ordinate and execute complex projects. My self-esteem remains extremely high and I consider myself a very accomplished researcher.

Contribution of research/entrepreneurship to society

Example: The topic of my project under the scheme is green energy... which can be used to lower the Global

pollution index & carbon footprint... My application is helping with assisted living for the elderly etc

During the project tenure I had worked on Isolation of root rot disease tolerant clones in ginger. The tolerant clones isolated adopting continuous and discontinuous in vitro selection techniques were subjected to in vitro and in vivo sick plot technique for confirming disease tolerance. The disease tolerant clones thus isolated were subjected to field trials in Hassan. The methodology developed has far reaching implication on developing root rot disease tolerant clones in ginger

Message to other women in Science

Example: To the women in science & technology field I would like to say that don't lose hope when you get dragged by family responsibilities. There is still hope and real time opportunity ... Govt is taking initiatives in building a platform for comeback...

Every woman will normally have to take a break during motherhood. But that should not come in the way of pursuing your interest. Keep nurturing your dreams and stay focussed on visualizing ways to get back to the main stream as early as feasible.

Feedback on scheme (how to improve further)

Example: More women are required to get aware about this scheme, so government should also put some effort in spreading awareness and should also increase the quantum of support under these schemes.

WoS- A scheme is an excellent initiative from the Government. The scheme should be widely publicised across general print and social media so as to reach women in all corners of India. When the field or clinical trials under any project indicate positive results the project should be mandatorily extended until commercial feasibility is proved. There should also be a mechanism for hand over preferably in the same lab if the project is promising and if PI is unable to continue with the project

Sangeetha Kannan

Sangeetha Kannan has completed her Masters in Biotechnology in year 2006 and has recently submitted her PhD thesis. She is currently working as a guest faculty at Maharani Cluster University, Bangalore. She is a proud mother of two children. She was a recipient of WOS-A fellowship between 2014-2017.



How was the academic & professional life of the beneficiary before joining the scheme?

Recipient of WOS-A FELLOWSHIP between 2014-2017, SR/WOS-A/LS-1056/2014

Before being awarded with the project, I was staying at home after my second baby was born. I was enjoying taking care of my children, however I was observant about the growing gap in my career and I was immensely worried if I will ever be able to start my career again.

How did the beneficiary got to know about this scheme

I heard about this scheme through my research guide under whom I joined to pursue my doctoral studies. He knew this scheme was for women who are keen to restart their career and found my circumstance appropriate. Therefore he suggested me to apply for the same.

How did you got passion to pursue career in STEM

I was very fascinated when I heard about the scheme. I immediately knew that this would give me a lot of learning opportunity as I was to pursue the project in a well-equipped laboratory with experienced lab-mates and highly motivated research guide. I felt that I was in the correct track to get back in stream.

How the scheme has helped the beneficiary to get back on the track after carrier break

When I applied for this scheme, I was not expecting that things will move in such a positive and forward manner after all these years of break. For me to recall the subject and stay confident was a challenge. However, my determination to go forward was very high. The interview was conducted and the whole

process was very smooth. The Department of Science and Technology was very quick in their selection procedure and the sanction was through within a month.

Rewards/Awards/achievements received during the scheme

During the scheme I have presented my work in many National and International conferences that helped me to grow as a researcher. I was recognised as a good presenter at my research Institute and the University which boosted my confidence that I had begun sealing my career gap. I was awarded the **Best Young Researchers forum award** in the **2nd Indo-global summit and Expo** on Veterinary 2015 organized by Omics International at Hyderabad on 26-28 Oct, 2015 for the oral presentation made on "Comparative growth kinetics and functional gene expression analysis in different media formulations for porcine mesenchymal stem cells in vitro." Also I received the **Appreciation award** from 'The president-Jain University trust and Principal Officers'. I have published a number of research papers in many peer reviewed journals as first author and associates from the work done using the research funding acquired through this scheme.

Critical Skills developed during the scheme

During WOS-A, I have developed hands on skills in maintaining animal stem cell lines, molecular biology techniques and data analysis, writing project proposals and research articles, presentation skills etc.

Impact of Fellowship/Internship of the scheme on

- Professional life

I am teaching in a reputed college and have helped several students in choosing right career paths.

My experience and knowledge in research is helping me to bridge the gap between academia and industry.

- Family front

I have through these years, learnt to manage work-life balance. I am also supporting my family

financially and have set a benchmark for my children to pursue what they love with great passion.

- **Personal Front**

I see myself as more confident individual than earlier and hope to contribute my best to the scientific community.

Contribution of research/entrepreneurship to society

The topic of my project under the scheme is “Maintaining stemness of mesenchymal stem cells (MSC) on the supplementation of a novel asymmetric cell kinetic inhibitor”. The findings of my study improve the existing MSC culture media and its composition for long term in vitro propagation and better differentiation which would be a boon for research, tissue engineering, transplantation therapy and genetic manipulation for production of transgenic and cloned farm animals.

Message to other women in Science

To the women in science & technology field I would like to say that schemes like WOS-A are excellent initiatives by the Government to help you retrieve back your career. I am sure there will be many such platforms in the near future which will permit you to rebuild your career dreams along with having a family. So do not panic about career break and lose hope.

Feedback on scheme (how to improve further)

If the Government can enhance awareness on the schemes, more women will be benefited by it. Schemes involving academia and research interactions may also be developed to bridge gaps in the various streams.

Dr. Hemalatha M.S. WOS-A Beneficiary

Dr. HEMALATHA, M.S. is currently working as Assistant Professor at Food Science and Nutrition Department, Karnataka state Open University, Mysuru. She completed her Ph.D. from CSIR-Central Food Technological Research Institute, Mysuru in the year 2013. She was awarded Research fellowships under Woman Scientist Scheme-A funded by Department of Science and Technology to pursue her doctoral research. She has published many research papers in peer reviewed journals and authored Book Chapters. She has presented research abstracts in many National and International Conferences and also been awarded for Best Research Papers. She is a wife and proud mother of 2 children. She has kept her career in phase along with her children and husband. Apart from her manuscripts being cited by scientific workers, her husband has brought laurels to his company and himself by winning many HR based awards. Her children have added feather to the cap by being toppers in Board examinations.



**Recipient of
WOS-A
FELLOWSHIP for
the year 2006;
SR/WOS-A/LS-
156/2006**

How was the academic & professional life of the beneficiary before joining the scheme?

When I was working at CSIR-CFTRI with BARC project, I conceived for my second baby and the project came to an end which made me impossible to register for Ph.D. I had to take a break for maternity and return back, which appeared that the doors for my doctoral degree was closed. Later, I came to know about DST-Woman science funding and applied for the project

How did the beneficiary got to know about this scheme?

I heard about the scheme from my colleague from another department at CSIR-CFTRI eventually she happened to be my classmate at class 11 and 12

How did you got passion to pursue career in STEM?

The passion for STEM was from school days, hence, moved through life science and pursued my career in Life Science.

How the scheme has helped the beneficiary to get back on the track after carrier break?

Applying for the scheme itself was a great learning, I went with the format to my research guide Dr. P.V.Salimath, Scientist, CSIR-CFTRI, he said you need to fill in. I started my first work of writing the project which I was not aware and felt am filling the application form. My research guide went on to give corrections enormously, I realised bundles of sheets taken for print and my venture to all possible journals and books with relevant study of my research was unpredictable. Until, I finished the project, I was confident with my research as well as the presentation am supposed to do for the project proposal. The interview was conducted at Delhi University, New Delhi in front of more than 8 Jury members. Thanks to my research guide who filled confidence in me by making my research mind stronger. The whole process went on smooth, with few jury members asking me queries relevant to the work without any hitches and the results were announced within 10 days.

Rewards/Awards/achievements received during the scheme

During the scheme I have attended many Technology conferences which were informative and inspiring. I have published my data in 6 national and international Conferences. My paper has been awarded 'Best Paper' at 6th International Food Convention (IFCON 2008) held at CSIR-CFTRI. My research articles have been published in peer-reviewed journals with impact factors.

Critical Skills developed during the scheme

During WOS-A, I haven't developed any critical skills, however, our study was the first to use enzyme treatment in Indian unleavened bread that is chapati.

Impact of Fellowship/Internship of the scheme on

- Professional life

I am working as Assistant professor at a reputed university, recently, I got my promotion from Level 10 to 11. I am running many courses in our Department-M.Sc. in Clinical Nutrition and Dietetics, PG Diploma in Nutrition and Dietetics, Diploma in Nutrition and Health Education and also Certificate program in Nutrition and Food for lay persons especially woman to be aware of nutrition to be provided for family and community. I have further applied for permission to UGC to start M.Sc. in Food Science and Nutrition. I have guided and currently guiding dissertation students of Post-graduate programme. I am also carrying out research in different fields of Nutrition through Ph.D. students. Ph.D. Students under my guidance are due for registration. I have published research papers in peer-reviewed journals

- Family front

The scheme helped me not only to pursue my career also helped me build financially. Am able to give quality life to my children and they are definitely inspired by my thought focus.

- Personal Front

On the personal front, I was glad that being Principal Investigator of the project under WOS-A, I had to sign for all reports and bills, whereas, for others it was the research guides. On the current day, am a confident researcher, teacher and administrator. I have worked in different capacities like Secretary and EC member in different scientific communities like IDA, NSI, etc.

Contribution of research/entrepreneurship to society

The topic of my project under the scheme is “Studies on proteins and pentosans on chapati making quality in different wheat cultivars” which happens to be the basic research work for application science in the field of milling and baking technology. My application work has helped food industries and food technologists in developing ready to eat food for Indian population.

Message to other women in Science

I always start and say 'Never too late', hence the women in science & technology field who are dragged by family responsibilities never lose hope, you definitely stand a chance here which is exclusively for woman who have taken break in the career. Take hope in yourself and develop this real time opportunity provided by the Government to building a platform for your career.

Feedback on scheme (how to improve further)

Women with any background are internet savvy and are more prone to FM listening. I suggest advertisement through pop-ups should be provided in internet and announced through possible Radio stations.

Success story of De. Sheela M.L.

Dr. Sheela ML finished her schooling and her bachelor's degree at her hometown Mysore and obtained her Master's degree from the University of Madras in Applied Microbiology in 2002. She joined Department of Biotechnology to work as a research fellow under the guidance of



Prof. Bharathi P Salimath (Prof. BPS) and bagged the fellowship to work as a project fellow for a Department of Biotechnology (DBT) funded project from 2003 to 2006. She enrolled for PhD in Biotechnology under Prof. BPS in 2006 and was awarded the doctorate degree in 2009. During her tenure as a research fellow, she bagged the fellowship from DST (WOS-A) scheme and served as a Principal Investigator for a project entitled “ Bioprospecting of Medicinal Plants for antiangiogenic activity using promoter reporter gene analysis targeting angiogenic genes” from 2007 to 2009.

Dr. Sheela later joined Triesta Sciences, a clinical diagnostic and R and D lab at Health care Global Enterprises, popularly known as HCG Cancer Hospital in Bangalore as a Jr. Research Scientist. Due to her fast learning capability and fast expedition and completion of the project works she handled, she was very soon promoted to Research scientist position within a year of joining the company. She completed nearly five pharma projects in a period of 3 years and was later trained in Next Generation sequencing technology to be able to do the testing for cancer patients to help for a better treatment. Presently, she is working as the Principal Scientist and Section head of Genomics department at Strand Life Sciences, Clinical Diagnostics and R and D at HCG, Bangalore. She is also responsible for training medical professionals, PhD's, M.Pharma candidates who enroll as Molecular Pathology fellows to get trained in various protocols of NGS for both solid and liquid cancers.

Dr. Sheela has about 15 years of research experience and has published 19 publications till date in national/international journals, has attended 10 conferences/ meetings and has co-authored a book along with her guide and colleagues.

How was the academic & professional life of the beneficiary before joining the scheme?

I had enrolled to PhD during the DBT project i was working as a project fellow. Once the project was completed in 2006, i was not supported by any fellowship due to which i had to take a break in between the PhD program. I immediately applied to DST WOS-A and was fortunate to get the fellowship from 2007 to 2009 which supported my completion of my PhD thesis along with the proposed project to DST WOS-A.

How did the beneficiary got to know about this scheme

Through my guide Prof. BPS who was a member of the selection panel from many years. She had also hosted the program at our Department of Biotechnology several times to select the eligible candidates during which we (research fellow's) had actively got involved.

How did you got passion to pursue career in STEM

During my MSc days at University of Madras, few of my faculty members were pursuing their doctorate along with teaching us. Several times, they would mention to us about the different experiments or the projects they were doing for their PhD which aroused my interest in continuing my education post my master's. Also, the fact that just having a master degree in this era will not help us in our career growth and to learn all the newest technologies' increased my interest more in getting into research.

How the scheme has helped the beneficiary to get back on the track after carrier break

Since it was very much necessary to bag a fellowship to support my doctorate program, my guide supported and encouraged me to apply for this scheme. I was in a break of almost one year after the completion of the DBT project. During this period, I applied for the DST WOS A scheme, was interviewed and got selected to be awarded the fellowship from 2007 to 2009. If not for this scheme, I should have tried any other funding which might have delayed and complete my PhD thesis.

Rewards/Awards/achievements received during the scheme

During the research under the DST WOS A scheme, I have published 4 international publications and have presented my work at three 3 national conferences.

Critical Skills developed during the scheme

During WOS-A, I learnt skills of Eukaryotic cell culture and Molecular Biology techniques.

Impact of Fellowship/Internship of the scheme on

- Professional life

I am working as a Principal Scientist and head of Genomics section at a Clinical Diagnostics and R and D company placed at HCG. Bangalore. I have trained several post graduates and medical professionals in Genomics and have published 6 research articles on Genomics in national/international journals.

- Family front

My family members have been supportive all through and have been encouraging me to pursue my career in my field. They are happy about my growth and success till now that boosts my interest to learn more. It is heart warming to hear when my child speaks about my area of interest to others. Hope to be a role model for her and to others.

- Personal Front

I see myself as an enthusiastic researcher who believes that there is no end to learning. I am fortunate to have got an opportunity to work in Genomics which will be the future for all treatments and help the physician's treat patients with targeted treatment.

Contribution of research/entrepreneurship to society

During the project period , I was successful in isolating and characterizing a novel antiangiogenic compound from the roots of *Glycyrrhiza glabra*. The antiangiogenic activity of the compound was confirmed by several in-vitro and in-vivo experiments. The study on that compound was later continued by my junior colleague.

Message to other women in Science

Most of the times it's we, women who face a lot of hurdles either because of marriage or during our motherhood due to which we end up taking a break from our career. There is always a re-entry to our passion wherever and however we are. We just have to be confident about ourselves that we are the ones who can multi task and that will help us get back to our line of interest.

Feedback on scheme (how to improve further)

DST WOS-A scheme has not only helped me to pursue my PhD but has also added a huge value to my CV to have bagged the fellowship. It is a wonderful scheme that is supporting women who want to get back to Science. I understand that women who get this fellowship can work only in Government affiliated colleges and labs. But, if the scheme is funded to those who can work on the projects even in private labs, more and more women will be encouraged to apply for the scheme as the opportunity to get to work in Government affiliated colleges or labs are minimal.

Dr. Vinaya Rani G

(To capture success stories from the beneficiaries)



Letter No.
SR/WOS-A/LS-
104/2013 (G),

**“My most heartfelt thanks for DST, New Delhi, for giving me the opportunity to
as Principal Investigator in DST WOS A grant and also for selecting as best women
scientist (DST WOS-A) from Karnataka”.**

Dr. Vinaya Rani G is basically from Mysore, Karnataka. She has obtained her bachelor and master degree from University of Mysore in the year 2003 and 2006 respectively. She has done M.Phil. in seed tech in DOS in Biotechnology, University of Mysore in 2007. She started her career at various positions like, in clinical research, Quintiles Bangalore and worked at Vikram Hospital and health care from 2007 to 2010. She has also worked as guest lecturer in Sri Mahadeshwara Government First Grade College for a year in Kollegal. Later she worked as Principal Investigator (DST- WOS-A) in DOS in Biotechnology, University of Mysore, Mysore. She is a lifetime member of various professional bodies includes Indian Science Congress Association (ISCA),GASYM.

Subsequently gained expertise and leadership skills necessary to successfully carry out the proposed research projects. She is currently serving as Clinical Research Investigator at the CDSA, DBT, Ministry of Science and Technology, Government of India, New Delhi sponsored Centre for Clinical Research Excellence at the prestigious JSS Academy of Higher Education and Research, Mysore. She is instrumental in conducting various workshops and also participated in various national and international conference/workshop as a resource person. As an organising secretary she has also conducted many workshops related to clinical research like ICH-GCP, research methodology and biostatistics workshops every year. She has been instrumental in setting up of research centre and contacted sponsors for clinical trials and has increased the footfall of sponsor clinical trials in the JSS hospital. She is good in trouble shooting and can quickly overcome the bottlenecks in research.

She has 6 years of research experience and 7 years in clinical research. She has published many papers in national and international peer reviewed journals, attended 9 national and international conferences

presented poster and oral presentations, attended 6 workshops and organised 7 workshops as an organising secretary and also as a resource person. During the project tenure, as a first author 3 papers are published in high impact international peer reviewed journals and a book chapter was published. I have deposited 113 nucleotide gene sequences to NCBI data base. Many papers are published as a co-author. She is working as a research officer in many vaccine, device and medicine (drug) clinical trials. She has completed 16 clinical trials and and 1 World Health Organization (WHO) sponsored trial as a research officer under the guidance of Prof. M D Ravi, JSS Medical College, Mysore. She had coordinated with different audits and inspections from sponsor/DCGI for many clinical trials. Currently handling 24 sponsored clinical trials as a research officer and in 11 are in pipeline.

She has coordinated with different audits and inspections from sponsor/DCGI for many clinical trials. At present handling 24 sponsored clinical trials as a research officer and 11 were in pipeline. Under the guidance of Prof. Prathibha Pereira, completed Indo-Australian La'trobe university DAHLIA project as a research office also working in ICMR sponsored COVID vaccine trail, BCG trail, Russian vaccine trail in this pandemic situation.

How was the academic & professional life of the beneficiary before joining the scheme?

I had taken break in my career after my M.Phil. degree to take care of my new born baby. I was unable to take full time task or job during that period. I was really fortunate to hear about the scheme applied and succeeded in receiving the grant in my first attempt.

How did the beneficiary got to know about this scheme?

I heard about this scheme through my department former chairperson **Prof. Bharathi P Salimath** and by research mentor **Prof. H S Prakash**.

How did you got passion to pursue career in STEM

I have a passion and positive attitude towards science right from beginning of my B.Sc days. Conducting experiments and visiting scientific labs made my desire strong to become a researcher. I was very eager to

enter into a good renowned lab and carry out the research activities. I strongly believe “Science of today is a technology of tomorrow”.

How the scheme has helped the beneficiary to get back on the track after carrier break

As I had passion towards research career, I was continuously looking for the opportunity for research. Due to my career break after marriage and kid, it was very difficult to get back to the research. During that period, I fortunately heard about WOS-A scheme by former chairperson of Biotechnology **Prof. Bharathi P Salimath** who encouraged to apply and supported me constantly. My research mentor **Prof. H S Prakash** guided me on the topic – “Isolation, characterization and the application of biocontrol agents from rhizosphere for the control of rhizome rot and leaf blight diseases of turmeric”. My sincere thanks for his guidance, co-operation and constant encouragement to complete the project within timelines.

I got the project grant in my first attempt as a blessing, this project means a lot to me to build my career. The interview committee of DST- WOS-A scheme was very cordial and encouraging. It provided me an opportunity to express my views and ideas about the proposed project. The fund transfer to university was very systematically and meticulously done by DST. Till the completion of project DST has supported financially very well which helped me to submit my thesis work intime. This scheme created a platform for me to work in a recognised university independently to update the knowledge and skills, manage finances, to balance between work and family life which helped me to develop confidence in myself.

Rewards/Awards/achievements received during the scheme

While perusing research under WOS-A scheme, During the project tenure, 3 papers related to project work were published in high impact international peer reviewed journals and a book chapter was published, and Co-authored 4 papers. 113 nucleotide gene sequences were deposited to NCBI data base. I have presented papers in 2 international, 7 national conferences and attended 3 workshops. I have developed a promising biocontrol agent for the control of rhizome rot and leaf blight diseases of turmeric.

Critical Skills developed during the scheme

During execution of project during WOS-A, I have developed skills pertaining to microbial identification (through molecular markers), formulation of biocontrol agents, development of consortium of biocontrol agents against diseases of turmeric. I have also acquainted knowledge related to gene analysis and clustering of genes by utilizing bioinformatics software's.

Impact of Fellowship/Internship of the scheme on

- Professional life

The DST- WOS-A scheme provided a solid platform to pursue a career in research. 7 papers are published in high impact international peer reviewed journals and a book chapter was published in that period. I have deposited 113 nucleotide gene sequences to NCBI data base. Attended 9 national and international conferences presented poster and oral presentations, attended 6 workshops and organised 7 workshops as an organising secretary and also as a resource person.

At present I am working as a research officer in many vaccine, device and medicine (drug) clinical trials. I have completed 16 clinical trials and 1 World Health Organization (WHO) sponsored trial as a research officer under the guidance of Prof. M D Ravi, JSS Medical College, Mysore. I had coordinated with different audits and inspections from sponsor/DCGI for many clinical trials. Currently handling 24 sponsored clinical trials as a research officer and in 11 are in pipeline. Under the guidance of Prof. Prathibha Pereira, completed Indo-Australian La'trobe university DAHLIA project as a research office also working in ICMR sponsored COVID vaccine trials in this pandemic situation. I thank JSSAHER for providing me this opportunity to work, I extend my special thanks to Pro-Chancellor Dr B Suresh, JSSAHER for his support. I thank the Principal, Dr Basavana Gowdappa, JSSMC, for his encouragement. I extend my thanks to CDSA-CCRE Team mentors Dr. Prathibha Periera for her extensive support and encouragement, I also thank Dr M D Ravi for his guidance.

- Family front

My family members were glad to note that the knowledge I have gained and the confidence after the completion of my Ph.D. And at present I am effectively involved in research field. They encouraged me as well and they are inspiring for the next generation children towards science and technology.

- Personal Front

I see myself as a strong candidate as an independent scientist with capacity to, coordinate and execute complex projects. I consider myself as an eminent researcher and my self confidence remains always extremely high.

Contribution of research/entrepreneurship to society

During the project I have worked on isolation, characterisation and the application of biocontrol agents from rhizosphere for the control of rhizome rot and leaf blight diseases of turmeric. Rhizome rot and leaf blight diseases are major diseases causing considerable yield loss to the farmers. Different biocontrol agents were isolated and characterized in the project. The promising candidate biocontrol agent were tested *in vitro* and *in vivo* conditions for the reduction of the disease. The promising candidate were subjected to field trials which reported in the effective reduction of both the diseases and also increased the overall productivity of the turmeric in the field. The methodology developed with implementation will help the farmers to become economically sustainable.

Message to other women in Science

Every women will have to take break during motherhood which should not be an obstruction for the scientific career. Without losing hopes to get back to career, stay focus on your goals and dreams. My message is “Don’t lose your hopes in achieving the scientific endeavour in spite of hostile conditions existing in the family responsibilities. Government is taking many initiatives in building platform for come back especially for women, kindly make use of the opportunities. “In the middle of every difficulty lies opportunity”.

Feedback on scheme (how to improve further)

Government has provided excellent initiative for women through DST- WOS-A scheme creating more awareness about the scientific funding in social and print media across India so has to reach women in all corners of India. Enhancing the intake of more numbers of women scientist aspirants helps them to utilize the opportunity. When the completed project indicates positive result, it has to be extended to prove commercial feasibility.

“Believe in yourself and work in the interest of your passion”

Chapter 6: SUGGESTIONS AND STRATEGIES

- a. Introduction
- b. Adopt any Methods, such as, SWOT, etc. for the specific issues raised in the Analysis as a part of suggestions
- c. Discussion on the Strategy which can be adopted for successful implementation by the stakeholders – Government, Beneficiaries.

Department of Science and Technology, CHORD and KIRAN Division ed has develop strategic plans for gender mainstreaming. They carefully created a vision of women scientists future and the strategies needed to get back to main stream of science post break in career due to family reasons. But many women scientists fail to realize their research project and fail to deliver the expected strategic results. Unfortunately, executive teams cannot pinpoint the reasons for this failure so they repeat the strategic planning cycle over and over, always hoping that the next strategic planning session will bring better results. And of course it doesn't. In our experience, there are certain critical factors that will ensure that our strategic plans are successfully implemented.

1. Engagement

“Only 86 women scientists of a total of 180 of them who were funded by DST and other agencies of the government responded to the strategic questionnaire driven survey. Of the 180 we were able to reach out to 136 candidates (75.55%). In all 63.34% of the women scientists responded online to the survey questionnaire.”

Strategic Planning is a process not an event. A key element in the process is the engagement of women scientists at all levels throughout the country. Engagement of the Principal Investigators (PI) of the NSTMIS project has generated additional input and helped build their commitment to the end plan. It is essential to involve PI's in the planning of strategy and direction for the organization. Like wise all brain storming sessions held resulted in inputs that:

- Provide insight into issues, challenges, concerns, and opportunities of women scientists through survey by use of structured questionnaire which otherwise may not have been known or fully understood.

The project team were involved in executing the strategies. Engaging them for strategy execution increased success rate of survey response.

2. Communication

Strategic Planning processes were successful because a bottom up and top down communication approach was taken. It started off with a email communication to all women scientists included in the survey informing them that a link for the questionnaire response process has to be undertaken. It includes how they will be involved in this process. This is the bottom up communication. This provided data input to the NSTMIS project at regional level (Karnataka) through feedback surveys, focus groups, meetings, etc.

It is followed by the top down communication. Senior management will share the strategic plan with employees. They will communicate to all employees how their engagement will help ensure success in the execution of these strategies.

3. Innovation

Innovative idea of including success stories of few (3 to 5) women scientists, giving participation certificates to all the responders motivated the women scientists to apply for independent grants for their sustained development.

4. Project Management

“Most devastatingly, 70% to 75% of the women scientists who intend to come back to main stream of scientific career failed to be funded and once again a road block arise besides break in career due to family reasons.

This requires a high involvement and commitment on the part of mentors and advisory committees to spend the time required for the revision of the projects for reconsideration for funding to ensure an increased participation of the women scientists in sustainable development of science and technology in India.

5. Culture

A top-down communication culture was adopted by DST CHORD division to share the strategic planning and execution of the survey questionnaire in the NSTMIS project. The success in the execution of the project is attributable to the engagement of the women scientists who appropriately participated in the survey.

5. SWOT

The strength of various schemes that have funded the women scientists for gender mainstreaming has a positive impact on women scientists. Continuation of the funding to the deserving good performers

further impacts the scientific sustenance of interest of women scientists.

Weakness is mainly on not getting the second chance in life of women scientists. Failing to be selected for the award of grants will have a negative impact. The way out for this is to construct committees to revisit the not funded projects and fine tune or modify the same to facilitate presentation in front of the advisory committee.

Conclusion

We have established a clear and meaningful strategic survey data points. Engaged stake holders at all levels to ensure success. Communicated with women throughout. Used an innovation process for all new development, research and learning , etc. strategies. Created projects to manage the quality and prioritize hands on training to ensure future involvement of women scientists in continued interest in research and developmental activities . Further re-shaping to evolve with new projects for women scientists promote gender mainstreaming.

Chapter 6.1: Major Findings

- Methods used to collect data from women scientists through survey questionnaire were designed
- Data showing problems faced during data collection from women scientists by the principal investigator were identified
- Women scientists with break in career who were awarded with research grant were identified
- The duration of break women scientists has had prior to availing the grant was noted
- Educational Qualification of Women Scientists at the Time of availing the Schemes was noted
- Field of Specialization of Women Scientists was identified
- Age of women scientists on date of project being awarded was noted
- Skill development hands-on training workshop attended by women scientists was conducted to bridge the gap was undertaken. NSTMIS: Skill development Training for women scientists/mentors
- Number of projects awarded to women scientists between 2003 to 2019 was identified
- Snow ball effect on collection of responses from women scientists was successful
- Host institutes in various cities of the study area, Karnataka that were chosen by women scientists was identified
- Category of women scientists who have worked under different schemes was noted
- Different reserch funding schemes availed by Women scientists to come back to mainstream of research was identified
- Number of survey responses with respect to total number of beneficiaries was enumerated
- Number of women scientists holding various positions across scheme was enumerated
- Scientific achievements by women scientists were identified and the
- List of candidates with good performance was short listed.

6.2 : Research Summary

Assessment of Government of India's Gender Mainstreaming Programs for Women in Science

Prof. Bharathi P Salimath

Regional Principal Investigator, South -West Region, Karnataka

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Department of Science and Technology (DST), India, has been actively engaged in creating an ecosystem and enabling an environment for women in S&T domain. DST through its various schemes and programmes is working towards the cause of promoting women in science. Having administered large number of funding schemes and programs time-to-time, it is impossible for the Government of India to measure and trace the impact merely based on the data submitted by the individual Women Scientists or respective organizations at the end of the completion of the project and consecutive funding support. In order to evaluate impact of these schemes and programmes, NSTIMS Division of Department of Science and Technology, Government of India has initiated a program and provided financial assistance for conducting a study to evaluate its gender mainstreaming programs. This network project thus offers an approach to evaluate the impact of women scientist by way of conducting a survey to evaluate its gender mainstreaming programs both at regional and national level. The online survey form being the main source for data collection, the information and secondary data collection included approaches to dig role of mentor, family and friends, peer group, opportunities arising during the journey of the stake holder in project time. Direct and snow ball modes of data collection revealed several aspects and their impact on mainstreaming of women scientists to embrace research and developmental activities. Between the years 2003 to 2019, 86 projects were sanctioned or awarded to women scientists in Karnataka State, India. Institutes in Bangalore and Mysuru districts were chosen as the work place by women beneficiaries. Highest representation of women scientists is under general category, it is recommended that more SC/ST and backward category candidates are to be encouraged. The statistical analysis of scheme wise representation of Women scientists in STEM indicates that the maximum number of women scientist are noted under DST-WOS A scheme, indicating the successes of the program, benefiting women scientist largely with break in career. A good number of women scientists are holding positions in institutes or universities across the state.

