MANAGING WORK-LIFE BALANCE

Role of CSIR-CRRI Women Scientists and Engineers in R&D Achievements

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Council of Scientific and Industrial Research, a premier autonomous R&D organization, is a multidisciplinary, multi locational set up, comprising of 38 laboratories and 47 regional centers has completed sixty one years of its existence. In India, it symbolizes a culture that links science with society through technology and industrial manufacture. CSIR-CRRI(CSIR-Central Road Research Institute) is one of these laboratories, established in 1952,is engaged in carrying out research and development projects on design, construction and maintenance of roads and runways ,traffic and transportation planning and safety audits of mega cities, landslide control, environmental pollution, road traffic safety, driver diagnostics, performance monitoring, and evaluation studies on highways. The institute has the competence to organize national and evolutional studies on highways. The institute has the competence to organize national and international training programmes to disseminate R&D finding to the society.

Present study reveals the role of women scientists and engineers working in CSIR-CRRI in perspective of their R&D scientific and industrial outputs for the benefits of the end-users i.e. society, it also highlights the strength of female scientists and engineers.

Through an opinion survey and observation matrix present study highlights their strength/capabilities in managing as well as balancing their working areas and other life aspects e.g. handling all responsibilities and leading businesses towards transforming through their R&D achievements.

1. INTRODUCTION

The scientific development of any country or the organisation mainly relies on the productivity, entrepreneurship, and creativity of its people. The representation of women in leadership positions in academic institutions, scientific and professional societies, and honorary organizations is low relative to the numbers of women qualified to hold these positions. Throughout the history, social life has been constructed on the basis of perceived differences between the sexes. This gendering of social life is created by the following three sets of processes in society: 1) perceived assumptions of gender differences, at the ideological level, are exaggerated and justified through arguments that draw from science or religion; 2) these differences, within the socio-economic processes of society, are assigned different, though seemingly natural roles and entitlements, to the resources of the family and community; and 3) individual identities are imperfectly correlated with the stereotypical images of gender group identities (Poonacha and Gopal, 2004).

CSIR-Central Road Research Institute (CRRI), a premier national laboratory established in 1952, a constituent of Council of Scientific and Industrial Research (CSIR) is engaged in carrying out research and development projects of roads, traffic and transportation planning. The institute also provides technical and consultancy
services to various user organizations in India and abroad. To maintain its scientific and engineering leadership amid increasing economic and educational globalization, scientists across the gender bias are continuously pursuing the innovative capacity of entire scientific group without any gender bias. Women scientists are making up an increasing proportion of science and engineering, including top scientific programmes such as receiving the Fulbright Fellow for Environmental Leadership Programme. Many Women scientists are working as senior scientists. They are holding responsible/head posts for leading many scientific areas e.g. traffic engineering and safety; transportation planning and environment; bridge engineering and other scientific areas. They have been deputed to many foreign countries under various scientific R&D Programmes and they are the coordinators and organisers at various national and international committees. In addition, they are actively involved in collaboration and networking with various international and national organizations for R&D projects.

1.1. POSITIVE STRENGTH OF THE WOMEN

Women have the ability and drive to succeed in science and engineering. Five attributes appear to be common to women who have earned S&E degrees and successfully pursued industrial employment—whether as practicing scientists and engineers, managers of scientists and engineers, or entrepreneurs in science-and-engineering-based companies. Those qualities are

(1) S&E expertise and competence,

(2) The ability to establish and meet goals and to take risks,

(3) Strong communication skills,

(4) Self-confidence, and

(5) Flexibility and openness to change.

1.2. SOCIETAL DEMAND OR PRESSURE vs. CARRIER

Though the science and engineering education and research are increasingly global endeavours for women still many of them have to work as a traditional career model due to the societal demand or pressure, especially if they have children or they are leaving in joint family. Because the burden of family, household, and community care generally falls more heavily on women than on men and because women seldom have substantial spousal support, women scientists and engineers often experience intense pressure and conflict between their family and professional roles and to fulfil their all demands.

A well-documented complex of biases known as the maternal wall or family responsibilities discrimination hampers the career advancement of women scientists and engineers with children who bear major care giving responsibilities. Those on highly competitive academic career tracks are aware of these issues and often make compromises to lessen the conflict or choose not to avail themselves of accommodations for which they are eligible, such as reducing work responsibilities,
out of fear of damaging their career prospects. Women scientists and engineers in fast-track positions, for example, are less likely than those on less competitive career tracks to be married or to have children. Those who are mothers tend to have fewer children than others engaged in other less challenging professions. Due to all these facts, the perseverance of women scientists and engineers is seldom perceived as evidence of the very high level of devotion to their profession that it represents.

Aims and Objectives

Present study highlights the strength of female scientists and engineers, their experiences, motivation and constraints faced during their career as a scientist in CSIR-CRRI.

2. Division-Wise Women Scientists/Engineer’s Strength

Why are there so few women in science? In Breaking into the Lab, Sue Rosser uses the experiences of successful women scientists and engineers to answer this question. Women are highly qualified, motivated students, and yet they have drastically higher rates of attrition, and they are shying away from the fields with the greatest demand for workers and the biggest economic payoffs, such as engineering, computer sciences, and the physical sciences. Our country can no longer afford to lose the talents of the women scientists and engineers. Women scientists should be motivated by the society to unlock the barriers and come into the new scientific frontiers of innovation and technology transfer, resulting in useful inventions and products to society.

In CSIR-Central Road Research institute research staff manpower is approximately five hundred and ten only, employees are categorised as Group IV (Scientists), Group III (Technical officers), Group II (Technicians) and Group I (helping staff). Among one hundred and forty total manpower strength of Group IV scientists, women scientists are only 12%. In Group III women manpower strength is only 13.75% and among them women engineers are only 9%. In group II and group I staff strength is about 129 and administrative staff is 161, among them that women are only 31(19.25%).

In CSIR-CRRI Research and Development Area has been divided into eight different divisions which are as following

a) Traffic Planning (GIS) and Transportation Economics Division
b) Traffic Engineering and Safety Division
c) Rigid Pavement Division
d) Pavement Evaluation Division
e) Geotechnical Division
f) Flexible Pavement Division
g) Environmental Science
h) Bridge and Structural Division

Among all of the Divisions traffic planning division have 38% women scientists, traffic engineering and Safety Division has 43% women, Rigid pavement division has 20%, Pavement Evaluation Division has 0%, geotechnical has 6%, flexible
pavement division has 29%, environment division has 43%, Bridge and structural division has 13% women scientists and engineers (Fig 1).

2. Opinion Survey conducted on Women Scientists and Engineers

To examine the various factors that affect women’s contribution and limitations in science, the CSIR-CRRI conducted an opinion survey was conducted in CSIR-CRRI Delhi on women staff working as an Engineer and scientists. In the survey, 82% women scientists and engineers out of the total sample population had participated. The questions pertaining from opinion survey were based on the socio-economic status of women, their career life and home environment, types of interaction and bondage with their spouse, relatives and friends etc. which helped to gather various informations on their socio-economic conditions, educational background, job and research-related organizational practices, career prospects on the scientific field, and their family details. Further the sample size was divided according to the age, marital status, discipline pursued by them, nature of work handled by them etc.

2.1. Age Wise Sample Distribution

Women scientists working at CSIR-CRRI are either experienced and senior scientists i.e. 40 and above 62% and young scientists i.e. below 30 years 21%, middle aged scientists 30-40 years are only 7% (Fig 2).
2.2. Marital Status Wise Sample Distribution

Married women scientists are 86% and unmarried are 14% among the total sample population.

![Fig 2: Age Wise Sample Distribution](image)

2.3. Discipline Pursued by the Women Scientists and Engineers

CSIR-CRRI is pursuing different R&D research practices, out of the whole sample population 7% women scientists are doing R&D on biological research, 21% are engaged in chemical research, 29% women scientists are involved in R&D in engineering areas, 43% are doing R&D in applied scientific fields (Fig 4). The women scientists and engineers are engaged in different R&D activities e.g. laboratory testing and supervision works in their respective R&D fields 22%, project planning and supervision 17%, technical and instrumental R&D works 26%, field work and data collection 26% and teaching R&D practices to post graduate students 9% (Fig 5).
2.4. Percent Motivation and Encouragement From the Parents and Relatives

Encouragement from the parents is necessary for the growth of the individual in any career, it works like positive motivation. It was observed from the present opinion survey of the CSIR-CRRI women scientists and Engineers that maximum source of positive motivation was parents i.e. father 34%, mother 25%, overall 59%; followed by siblings (brother / sisters 19%) and teachers 13%. This shows that family bondage is prominent and strong in India which provides positive motivation and helps in pursuing good careers oriented jobs (Fig 6).

2.5. Important Reasons and Motivational Aspects for Accepting the Present Job

The reason behind pursuing the present job, 52% women scientists and engineers expressed that present job was suitable according to their qualification, 26% expressed that the office and home commuting was easy as the distance was according to their convenience. They also expressed that present job was good with congenial atmosphere (26%). However, 4% of them did not express any opinion in this area (Fig 7).

When asked about the motivational aspects at workplace, 50% women scientists/engineers replied that they were motivated as they had interest in their respective R&D scientific areas, 22% expressed that they were working for their career improvement, 17% were the opinion that their job timing was suitable for carrying out their other duties i.e. household management duties, 6% of them
expressed that working environment was congenial and healthy. However, 6% of them did not express any opinion in this area (Fig 8).

2.6. The Designation and Level of Satisfaction in Present Scientific Career

The analysis of survey data reveals 7% of the women scientists are working as director grade scientists i.e. chief scientist, 33% are senior principal scientists, 13% are principal scientists, 20% are senior scientists and 27% are scientist. This highlights that majority of the women scientists are working at senior positions (Fig 9). The data shows that 14% women scientist are very much satisfied with the present scientific career as they have rated their level of satisfaction as “Outstanding level”, 36% women scientists and engineers are having “Very Good” satisfaction level while 43% women scientists have shown “Good” satisfaction level at the present scientific career (Fig 10).

2.7. Main Achievements During Present Scientific Career

The opinion survey data reveals that women scientists and engineers are very much satisfied as they have job satisfaction 26%, family life satisfaction due to the present job 26% and they have educational satisfactions 26%, 21% women scientists and engineers have shown that they were also satisfied with their designations in the present job (Fig 11).
2.8. Women Scientists and Transport Facilities

Women are more dependent on public transport than men. Unfortunately, the off-peak and peripheral public transit routes on which many women depend for their travel to shopping or social facilities have much less priority than the radial commuter corridors going straight to the city centre. Women’s complex household and caretaking responsibilities usually force women to make multiple stops. This also often makes it much more costly for women to get around, since they may have to pay numerous single fare tickets during such a chained trip (Nishi et al 2010).

A study was carried out by IIT Delhi in 2006 (4) to study the profile of working women and their mobility issues for slum located in the heart of the affluent sections of Delhi. The results showed that women either walked (52%) or used public transport bus (43%) to commute to work.

Personal safety and the avoidance of harassment are also major concerns for women public transit users. Women are especially vulnerable to violent attacks or sexual abuse when transporting and accompanying children, and this can be a major deterrent for women to use public means of transport.

Finally, there are cultural constraints which often prevent women from properly accessing public transport. It is socially difficult for women to share crowded buses with mainly male riders because of the religious dogma or social seclusion of women.

Present opinion survey reveals that 39% of the Women scientists are commuting by public transport, while 28% women scientists have their own cars, out of which 11% have chauffeur driven cars, rest of the 17% commute by LCV Auto and Taxi, 16% of them are commuting through car pooling. Thus the present data shows that majority of women scientists 61% are having own provision of commuting which is safe and comfortable. 39% of the women scientists are commuting through public transport which is also now safe, comfortable and sustainable. However, 60% of them clearly expressed that they were facing commuting problems as their workplace is far from their home so they have often face traffic jam and other inconvenience while commuting to and from workplace to home.
3. Conclusion of The Present Survey

To maintain its scientific and engineering leadership amid increasing economic and educational globalization, India must aggressively pursue the innovative capacity of its entire people—women and men. Women make up an increasing proportion of science and engineering majors at all institutions, including top programs such as those at the Massachusetts Institute of Technology where women make up 51% of its science undergraduates and 35% of its engineering undergraduates. For women to participate to their full potential across all science and engineering fields, they must see a career path that allows them to reach their full intellectual potential. Much remains to be done to achieve that goal.

Women are a small portion of the science and engineering faculty members at research universities, and they typically receive fewer resources and less support than their male colleagues. The representation of women in leadership positions in our academic institutions, scientific and professional societies, and honorary organizations is low relative to the numbers of women qualified to hold these positions. It is not lack of talent, but unintentional biases of the social structure that are hindering the access and advancement of women. Neither our academic institutions nor our nation can afford such underuse of precious human capital in science and engineering. The time to take action is now.
References:


