WOMEN IN THE ENGINEERING PROFESSION IN INDIA – THE MILLENIUM SCENARIO

EXECUTIVE SUMMARY

The present study is a sequel to a broad based study conducted earlier by the authors in 1987-90 on the participation of women in engineering courses and in the engineering profession. It was found then that the percentage of women in engineering courses had increased rapidly from about 1% in 1975 to about 10% in 1990. The study also revealed that women engineers were not being received well in the engineering job market. Over 26% of them were unemployed. Unemployment level was found to be higher in the states and in the disciplines having a higher population of women engineers. It was seen that the largest number of women were employed in Technical Educational Institutes (TEI). Private Industries ranked last as far as employment was concerned. Comparatively lower salary levels and a slower pace of career advancement were amongst the other findings of the study. The study indicated that women have to face problems at every stage of their career; in college, practical training, getting a job interview, getting a job, technical level of the work assigned to them and in earning recognition for their contributions in terms of career growth.

The present study is motivated by the concern caused by the findings of the previous study and the fact that the past decade has seen a further increase in women participation levels in the engineering profession. It was considered important to establish the current co-ordinates of the scenario, particularly the job and career status of women engineers. The study has been conducted in two parts. In the first part, the job and career status of a target group of women engineers has been studied through data received from the group members through replies to a specially designed questionnaire. The second part of the study consisted in obtaining the employers' viewpoint on hiring of women as engineering professionals. Contact was made with several organisations having engineers on their roll. Their views on the subject were obtained through replies to another structured questionnaire. Their responses provided a glimpse of the employers' side of the story. Availability of information from both sides has provided a rational and firm basis for formulation of a set of recommendations.

PHASE-I : JOB AND CAREER STATUS OF WOMEN ENGINEERS

SAMPLE DEFINITION OF WOMEN ENGINEERS

The target sample for the present study were women who had obtained their Bachelor's degree during the period 1994-98 in one of the six selected disciplines (Civil Engineering, Computer Science and Engineering, Electrical Engineering, Electronics Engineering, Mechanical Engineering and Architecture) and were located within the seven states of Andhra Pradesh, Delhi, Gujarat, Karnataka, Kerala, Maharashtra and Tamil Nadu. Out of the total stock, 11778 women (TS) were located through systematic efforts. Primary information about their year of

graduation, branch of specialisation and state was gathered. Confirmed contact particulars were obtained for 2310 of these (DS). A structured questionnaire was mailed to all the 2310 members. 1020 completed replies were received and analysed. The group, which completed the questionnaire, is named as the Questionnaire Response Sample (QRS). Checks show that QRS is a random sample and is representative of the target stock.

Examination of the data shows that a large number and population fraction of DS and QRS belongs to Maharashtra and Tamil Nadu. This is a change from the previous scenario where Kerala ranked highest. Electronics Engineering is the most preferred branch (34.7%) followed by Civil Engineering and Computer Science, Electrical Engineering and Mechanical Engineering. Electronics Engineering has maintained its rank regarding branch preference of women engineers.

PERSONAL AND ACADEMIC BACKGROUND

Most of the women engineers belong to educated families with over 70% having a father with a graduate degree or a higher qualification. Over 98% of the married women (280 out of 1020) have a husband with a graduate degree or a higher qualification.

The largest number did their schooling in Government and Semi-Government schools. 60% of the respondents had English as the medium of instruction in school. Taking up engineering as a career is by and large a planned affair for most girls. The performance of the women at the engineering college is generally good. Over 72% belong to the top 25% of the class in the degree examination.

PERCEPTIONS, CAREER GOALS AND VALUES

Personal Qualities

Out of the three personal qualities, 'Personal drive and determination, Self-confidence and Intellectual abilities', 'Personal drive and determination' is rated by respondents as the greatest contributor to their academic and career success.

Personal Priorities and Values

35% of women engineers are inclined to think that 'For a married woman, a career should be secondary to her responsibilities as wife and mother'. In addition, 20% have the same as a conviction. A lower but comparable number accounting for 42% of the respondents disagree with the statement.

The statement, 'Small children suffer when mothers work full time' has been endorsed fully or partially by over 84% of the respondents. Most women disagree strongly with the suggestion that 'A woman who is really interested in her career should not have children'. These responses underline the value they assign to motherhood.

The response to the statement 'A working woman cannot manage both work and home without sacrificing either' radiates confidence and conviction. About 2/3rds of the respondents have expressed clear disagreement with the statement.

'In a conflict between a husband's career and a wife's career, the husband's career should come first'. Over 42% of the respondents agree whereas 46% disagree with the notion. The response of married women is more towards agreement.

The statement 'Men can raise small children just as women can' is endorsed by 59% of the respondents. Percentage-wise the responses of married and single women are comparable.

55% of the respondents state that they would not be comfortable 'If husband kept house'. Although the fraction nurturing such a notion is higher amongst married women, the same feeling is prevalent even amongst unmarried women.

The need for support from family and husband is considered important and essential for a woman to have a successful career This notion is unanimously endorsed by all the respondents, married or unmarried.

These responses underline the fact that priorities and values nurtured by Indian women engineers are essentially similar to those nurtured by Indian women in general.

Professional Perceptions and Values

Over 60% of the respondents agree that 'Even today, professional women end-up in secondary roles doing routine jobs'. This indicates that there is under utilisation of the capabilities and skills of women engineers. A majority (55%) agree with the statement 'Compared to a man, it is harder for a woman to be accepted fully into a professional working group'. About 70% of the women engineers agree with the notion that 'Women will have to do better than men to get equal professional recognition'. It is felt that the women's movement has been a major force in opening up professional career for women. These responses are only marginally different from the ones received ten years ago.

The statement 'Since child rearing is demanding, the present work structure should be modified to enable a woman to continue her career without a break' has received overwhelming support. Over 80% of the respondents have affirmed the need for changing the work structure with inclusion of part-time and flexi-time work schedule as well as provision of working from, home wherever possible.

Career Goals

The respondents perceive 'Opportunity for personal growth' and 'A feeling of security' as the most desirable career goals. These are also perceived as the career goals which have been realised by them to the maximum extent.

Job Type Preferences

In terms of job type preference, an 'Execution' type job is preferred by 37.1% and a 'Desk' type by 26%. This is a change from the preference indicated in the previous project where the majority were in favour of a 'Desk' type job.

A majority of the respondents do not have a preference for either 'Men' or 'Women' as a 'Superior' or as a 'Subordinate'. Clearly this is not an issue of any concern.

Job and Employment Status

Out of the 1020 respondents, 472 (46.3%) were continuously employed and 215 (21.1%) continuously unemployed since graduation. The remaining 333 (32.6%) had been intermittently employed and/or were pursuing further studies. Taking into account the employed and unemployed persons in the intermittently employed group, the employed persons at the time of data collection were 560 (54.9%), while the unemployed were 312 (30.6%). The remaining 148 (14.5%) respondents were pursuing higher studies.

Among the continuously employed respondents, the highest number belong to the 1998 batch. Branch-wise, the highest percentage were in Computer Science and the lowest in Civil Engineering, while on a state-wise basis, the highest percentage were in Gujarat (62.3%) followed by Maharashtra (54.1%) and the lowest in Kerala (25.2%) closely followed by Andhra Pradesh (28.4%).

As far as unemployment is concerned, the overall percentage was 26.1% in the previous study. Thus, there has been an increase of 4.5% in this respect. The percentage unemployment was found to be highest amongst the graduates of Electrical Engineering and Electronics Engineering, 29.2% and 28.8% respectively. With the inclusion of the unemployed part from the intermittently employed, these percentages increase to 37.3% and 36.4% respectively.

Amongst the states, Andhra Pradesh tops the list with over 43% of the engineering graduates remaining unemployed since graduation and 45.7% overall unemployment. These figures are higher than the corresponding ones for the state of Kerala. In the previous study, about ten years back, Kerala topped the list, with maximum unemployment.

Amongst Electronics engineers from Kerala, the unemployment comes out to be 70.6% and for those from Andhra Pradesh, 64.7%. These are unbelievably high figures and reflect an overall grave employment situation in the field of Electronics Engineering. In the previous study, the highest unemployment (50%) was found to be the combination of Kerala and Civil Engineering. The scenario has therefore changed.

The percentage of women engineers taking up higher studies is seen to be increasing in the later years. The highest percentage pertains to Civil Engineering. Lesser the job opportunities, greater are the number and fraction which takes up higher studies. This seems to be the general rule.

Career Profiles and Problems

a. Women Engineers Employed Continuously After Graduation

52% of the employed women engineers got their job by responding to advertisements. Although the majority did not have any problem in getting invited for a campus interview, a significant number (69 out of 472) did have some problem in this regard. 24% of the continuously employed respondents did not attend any campus interview due to many reasons including not being invited/permitted to do so by the employer/college. Amongst these, 81 did not attend any campus interview

because there was none at their college. 51% of those who attended campus interviews got selected. One of the frequently mentioned reasons for non-selection is 'Preference to men'. The other reasons relate to academic performance and personal proficiencies of the respondents.

Amongst the continuously employed women engineers, 353 out of 472 did not face any difficulty in being called for a job interview. Amongst the 84 who have had difficulty, mention of 'Preference to men' predominates followed by 'Lack of experience'. The majority, 365 out of 472 did not face any difficulty in getting a job, 85 had some difficulty. Employers not being aware of the new course names floated by some colleges are mentioned as one of the difficulties in getting a job.

Over 40% of the respondents have rejected a job offer 'Low salary', 'Distance from home' and 'Better job offer' are frequently mentioned reasons for job rejection. The prime motivation for taking up a job is for 'Experience'. 'Better professional prospects' is the most predominant reason followed by 'Not satisfied with the type of job' for leaving a job. 'Marriage' also figures prominently in this context.

Over 2/3rds of the respondents had their first job in the field of their specialisation. Most of the continuously employed women engineers do a full time job. Teaching predominates in terms of the nature of job followed by Design, EDP/Computers and R&D. This scenario is similar to the one obtained in the previous study.

Sector of Work

In terms of sector of work, Private Industry (Small-scale) (32.2%) and Technical Education Institutions (30.2%) are the largest avenues for employment of women engineers followed by Private Industry (Large-scale) (21.6%). This is a change from the previous situation, wherein the total industrial employment accounted only for 21.8% jobs. Industrial employment as a sector of work has definitely increased as compared to the previous study.

Type of Employer	***Current Study (%)***	***Previous Study (%)***
Govt. or Civil Service	*3.4*	*22.0*
Private Industry (Large-scale)	*21.6*	*12.7*
Private Industry (Small-scale)	***32.2***	*9.1*
R&D Organisation (Govt. & Private)	*5.2*	*8.9*
Public Sector Units (PSU)	*6.5*	*18.9*
Educational Institution	*30.2*	***26.9***
Others	*0.9*	*1.5*
Total	***100.0***	***100.0***

Rating of the Current Job

The current job has been rated 'Average' by the respondents; neither too personal nor impersonal, as far as the general work atmosphere is concerned. The place of

work is found to be less pressurised and more relaxed. Majority of the respondents have appreciated the 'Degree of structure' in their organisations. The largest number rate their current job as 'Average' in regard to the 'Independence allowed in working'. Similarly 'Recognition and reward for efforts' are also perceived as 'Average' in their current jobs. On the other hand, the respondents have rated their current job as 'Good' in regard to opportunity for advancement as an engineer and climate for women. Majority of women indicate that they are well accepted in their current job and fit well in the same. 49% of them have their current job 'Related to their field of specialisation' and a large number feel that their current position is commensurate with their education and training. The overall picture is thus very positive on certain counts and not so positive on certain other counts.

Being engaged in satisfying work, utilisation of skills and abilities, freedom to manage their own work, opportunity to work on an idea, opportunity to keep abreast of the latest developments, being original and creative, involvement in technical work, opportunity to contribute to society, colleagues interested in new development and freedom to select their own project are the job-related intrinsic factors. The respondents assign highest importance to all these. Rating of the current job however is not comparable to the degree of importance except with respect to 'Being engaged in satisfying work' and 'Opportunity to contribute to society'. The rating with respect to all other factors is lower, the lowest being with regard to 'Freedom of selecting their own project'.

The extrinsic factors such as co-operative and pleasant workers, availability of personal leave, availability of crèche, no pressure to conform in personal life, desirable location, knowing the work responsibility, organisation respecting the family responsibilities, job security, flexible working hours, freedom from pressure to excel and opportunity to handle variety of work; are all extremely important to a majority of the respondents. Amongst these, highest ratings have been received by 'No pressure to conform in personal life', 'Desirable location', 'Knowing the work responsibility' and 'Job security' as far as their current job is concerned. The current job has been rated lowest in regards to 'Availability of crèche' and 'Flexible working hours'. These provisions do not exist in the present job structures.

All the listed career advancement factors; 'Delegation of responsibility', 'Opportunity to move into management', 'Opportunity to exercise leadership', 'Assignment in different areas', 'Opportunity to travel' and 'Enhanced social status', are considered most important by the largest fraction of the respondent group. The current job however does not match the level of importance assigned to these factors by the respondents. The current jobs have been rated lowest in regards to 'Opportunity to move into management' and 'Opportunity to travel'. All other factors have received mid-range rating, not commensurate with the degree of their perceived importance.

The respondents perceive 'Functional performance' as the most important criterion for promotion in their organisations. 'Educational qualification' and 'Tenure' follow in that order 'Gender' is found to be an inconsequential factor on this count.

Promotion of a woman engineer with the same education, experience and job performance is considered 'Most likely' by 39.6% respondents and 'Less likely' by an additional 26.7%. About 71% of the respondents affirm the chances of their securing a management or administrative position in the organisation.

b. Women Engineers Unemployed Since Graduation

Out of the 215 women engineers unemployed since graduation, 88% were seeking employment for a period varying from six months to more than a year. A majority of these women had never attended a campus interview due to there being no campus interviews at their college.

183 out of 215 had applied for a job. The response to their job application was highest from the Technical Education Institutions, followed by Private Industry (Small-scale), Private Industry (Large-scale) and PSU, in that order. 'No response' to job applications figures as prominently as the 'Positive response' from most types of organisations.

87 out of 215 unemployed members report having rejected a job offer at some time or the other. 'Salary too low', 'Not allowed by parents' and 'Lack of hostel facilities' appear to be the most frequent reasons for rejecting a job offer.

The respondents perceive that they had remained unemployed due to lack of job opportunities; overall or at the place of stay or in the area of specialisation. Expenses involved in getting a job, may it be towards the traveling expenditure to the place of interview or an official payment requirement are also perceived as important factors for not being able to secure a job. Women engineers from a rural background and non-metro areas face such problems more severely.

c. Women Engineers Pursuing Further Studies, Intermittently Employed, etc.

333 QRS members belong to this category, 148 pursuing further studies and 185 being employed intermittently. The main motivation for taking up further studies is the need to add to one's knowledge in the chosen career. However, a significant number take up further studies for want of a job. Women engineers possessing higher qualification plan on going in for R&D jobs or for teaching.

Unsatisfactory work or unsatisfactory work conditions are found to be the prime reasons for intermittence of the jobs. Family requirements also propelled some of the job changes.

122 out of 185 members of the intermittently employed group report to have had a career break at some time or the other 'Marriage' and 'Pregnancy' account for as many job changes as those resulting due to professional reasons such as 'Unfavourable job atmosphere', 'Low salary', etc.

A majority of women miss their professional work and want to come back to the profession after a break. Amongst the prime motivation for returning to work, 'A desire to be independent' and 'Have their own identity' figure predominantly. Non-availability of job in the field of specialisation or city/town of residence are the main difficulties associated with returning to work.

75 out 185 intermittently employed members report having refused a job. Similar to the unemployed group, here too 'Salary too low' and 'Family constraints' constitute the main reasons for refusing the job offer Reasons for leaving a job include 'Unsatisfactory job type' and 'Better professional prospects'. 'Training period getting over', 'Temporary job' also figure significantly as much as 'Marriage'.

Private Industry (Small-scale) tops the list as the first employer of the intermittent job holders. Educational Institutions follow. In the current employment data however, the number employed in Educational Institutions are more than those in Private Industries (Small-scale).

PHASE-II : EMPLOYERS' VIEWPOINT ON WOMEN IN THE ENGINEERING PROFESSION

THE RESPONDING ORGANISATIONS

The responding organisations cover a wide spectrum, type-wise, viz. Private Industries, PSUs, TEIs, R&D organisations and other Govt. and Semi-Govt. organisations. The largest response has been received from TEIs and industries. TEIs responded to the mailings, but industries had to be persuaded through personal approach. In all, the response to the 'Questionnaire for Employer/Executives' has been obtained from 104 organisations.

The employment data of the responding organisations shows that women engineers constitute about 21% of the engineering staff of TEIs, whereas in industries, the percentage is only 3.5%. On the whole for the 82 organisations that have provided the employment data, the percentage of women engineers works out to be 6.1%.

Participation of women engineers in management is low. It decreases with increase in the level of management. Amongst all types of organisations, industries rank the lowest as far as participation of women engineers in management is concerned. It is only 7.6% at the lower management level and decreases to 2.4% at the upper level. In contrast, in TEIs the participation of women in management is relatively good. It is 22.9% at the lower management level and decreases to 5.7% at the upper level.

As far as formation of working groups is concerned, 85.6% of the organisations report that they have mixed working groups. Only 9 out of 104 organisations state that they have 'All men' working groups.

71.1% of the responding organisations have a rating system for promotion. Out of these, 85.1% have a formal rating system. Almost all organisations have the same rating system for men and women engineers irrespective of the level of management.

Most organisations (90 out of 104) have provision for maternity leave. Only 3 have no provision and 11 have not responded to this question. The most frequent maternity leave provision ranges between 90 to 135 days. Re-entry/re-induction programmes for women after maternity leave are non-existent.

Special provisions for women such as flexible-time slots, option of working from home, part-time job option and availability of crèche etc., exist in a very limited number of organisations. The need for such provisions is apparently not felt by the employers.

Only 20 out of 104 organisations have a policy regarding employment of both husband and wife. Out of these, 3 organisations discourage employment of husband and wife, while 13 encourage the same.

As regards having any special policy for encouraging women engineers is concerned, 88 out of 104 organisations state that they have no special policy. Others have chosen not to respond to this question.

THE RESPONDING EXECUTIVES

129 executives have completed the 'Questionnaire for Executive/Employer'. Out of these, 17 are women. 'Administration' and 'Management' predominate as far as the nature of responsibility of these respondents is concerned. 82 of these belong to the upper management level, while 43 are from the middle management level.

112 out of the 129 executives are engineers (including 5 architects). Out of these, over 60% have a post-graduate qualification. Most of them have long working experience.

Views and Perceptions of the Executives

'Women are competent enough to be successful in the engineering field'. Accepted fully by a large majority of the men respondents (80.4%) and all women executives.

'It is acceptable for women to assume leadership roles in industry as often as men'. Agreed to fully by about 70% of the men and women respondents.

'Women possess the self-confidence required of a competent engineer'. 67.9% of the men and 76.5% of the women 'Agree fully' with this statement although the numbers under 'Agree somewhat' category are also significant (28.7%).

'There is no difference between the experience, knowledge and interaction style of men and women engineers'. Opinion on this statement is also positive. About half (48.1%) 'Agree fully' and the other half (51.2%) 'Agree somewhat' with the remark. 'Do not agree' category is negligible.

Very few men and no women respondents agree with the statement 'Women engineers cannot work on the shop-floor'.

'Women cannot handle tough negotiations'. This statement is refuted by the respondents, 76.7% 'Do not agree'.

'Women cannot take up jobs involving travel'. A large majority of the men and women respondents do not see the travel needs of jobs as a barrier for employing women engineers.

'To be a successful engineer, a woman does not have to sacrifice her femininity'. 68.8% of men respondents and 94.1% women respondents 'Agree fully' with this statement.

'The possibility of pregnancy does not make a woman less acceptable as an employee'. The response is mixed. 45.0% 'Agree fully', but 37.2% 'Agree somewhat' and 15.5% 'Do not agree'. Clearly the possibility of pregnancy is an issue that influences the employment of women.

'A full time employed mother of pre-school children is just as good as any other employee'. Only 38.0% 'Agree fully' with this statement. 41.9% have some reservations and 19.4% 'Do not agree'.

The response to the statement, 'It is equally important for a wife to have a career as to help her husband with his career' is generally positive. More than half (57.4%) 'Agree fully', while 28.7% 'Agree somewhat'.

The opinion on the statement 'Women engineers cannot work beyond office hours and/ or on weekends' is divided. A significant number of men and women (27.9%) 'Agree', but a larger number (37.2%) 'Do not agree' with the statement. On the whole, working beyond office hours is not perceived to be a major barrier in employing women engineers.

'Women engineers cannot supervise male subordinates'. Supervision of male subordinates is not perceived as a problem. Almost all the respondents disagree with the statement.

'Women engineers do not join the male colleagues in informal groups and there is a certain amount of self-exclusion'. 56.6% of the respondents 'Do not agree' with this statement.

The majority agree fully or to some extent that 'Women cannot balance their work with their family, as they would have to give priority to children'.

A significant fraction of men have affirmed their concern about women engineers getting married and leaving the job. Surprisingly, a significant number of women respondents have also expressed such a concern. A comparatively lesser number of men and women are concerned about women needing maternity leave. 93 out of 129 have not expressed a concern on this count.

Special provisions like 'Flexible time slots' for young mothers and 'Provision of crèche' have been widely supported by a majority of the respondents. On the other hand, their views regarding provisions like 'Working from home' and 'Part-time job' option are divided.

A majority of the executives, both men and women, involved in interviewing and recruitment process do not seem to be aware of the legal implications of women being questioned differently at the interview. A definite awareness programme in this respect seems to be a necessity.

Most of the executives do not think there is any difference in the skills and characteristics of men and women engineers. Nevertheless, on further enquiry, they have given a long list of men-specific and women-specific qualities.

Women have been rated 'Same as men engineers' with regards to 'Technical skills' by a majority of the respondents, men as well as women. Although 'Same as men engineers' predominates with respect to other performance facets also, a significant number of men find the performance of women engineers 'Lesser than men engineers' with regards to 'Supervision'. A significant number feel that they are 'Better than men engineers' with respect to 'Interpersonal skills', 'Public Relations' and 'Communication'. As regards 'Overall suitability' almost all respondents have rated women 'Same as men engineers'.

A majority of executives perceive that there is no adverse influence of women engineers on their 'Job assignment & responsibilities', 'Job performance' and 'Advancement opportunity'. The experience seems to be that women engineers do not allow their job responsibility to be affected by their personal responsibilities. The data also reveals that some women refuse professional opportunities to cater to family needs rather than accepting the same and not performing adequately.

The responding executives feel that women engineers are treated equal to others and are accepted as equals. This is true whether they are colleagues in the work places, subordinates or superiors. There are only a few responses, which mention discriminatory or preferential treatment.

The statement 'Women engineers have to work harder to prove themselves to earn the same credibility as male engineers in similar positions' has received a mixed response. Whereas a very large number of men do not find the statement correct, the same is not the case with women. This is reflected in the data as well as through the comments provided by the respondents.

There is a mixed response in regards to the existence of problems/difficulties that women engineers experience in the work place. Difficulties involved in late night working and working beyond office hours have been mentioned most frequently along with many other personal, inter-personal and professional problems.

Opportunity for advancement of women engineers is perceived to be equal by a majority of the respondents for the middle and lower management levels. However, it is not so strongly reflected for the upper management level where significant numbers perceive lesser opportunity for advancement for women engineers.

Computer Science/Engineering has been considered as the specialisation best suited for women followed by Electronics Engineering and Architecture.

Teaching emerges as the job best suited for women engineers followed by Design, EDP and R&D, in that order.

Special Measures and Policies

Opinions regarding the need for having a company directive to avoid gender bias in the process of selection of engineering staff is equally divided. Opposition is based on the premise that selection has to be merit based and does not need any policies.

On the other hand, advocates of a company directive stress the need for the same so that any discrimination against women engineers can be avoided. Amongst several suggestions given by the respondents, two important ones are (i) to have a woman member in the selection committee and (ii) to mention in the advertisement that the company is an equal opportunity employer.

A majority of the respondents do not find it necessary to identify women engineers with managerial potentials and to create a fast track for them. The premise is that equal opportunity and not special treatment will bring the best out of them.

Respondents feel that the reasons for low visibility of women in the engineering job market are of three types: typically women-specific personal reasons, personal-cum-professional reasons and reasons related to the work environment and attitudes of the employer.

A majority of the respondents feel that it is possible to correct this scenario of low visibility of women in the engineering job market. In order to do so, inputs have to come from the family, from women themselves and also from the employers. The family has to provide support, women engineers have to perform and the employers have to formulate policies to avoid any bias against women.

Regarding the possibility of giving preference in selection to men or women if both were equally qualified and experienced professionals, a larger number of respondents have expressed their preference for a woman engineer. Discipline, punctuality, hard work and obedience are stated to be the qualities of women engineers because of which respondents would like to exercise a preference in their favour.

THE EMPLOYERS'/EXECUTIVES' VIEWPOINT – OVERALL REFLECTIONS

The overall reflections of this part of the study dealing with collection and compilation of the employers' viewpoint are both positive and negative. Replies to the formal questions suggest a very positive attitude towards hiring of women engineers. Women engineers are perceived as capable professionals with high potential. Such a positive response could either be because of general acceptance of 'Women in engineering' as a ground reality and a realisation that any resistance to their entry is likely to be futile. It could also be due to the alertness and anxiety of the executive respondents to be legally correct in responding to such questions. The opinions coming through the replies to certain other questions, however, indicate that these very positive responses may not necessarily be an expression of their inner beliefs and values. Although the capabilities of women as engineers are generally not questioned, unexpressed reservations about the concept of women participation in the engineering profession are clearly visible through the remarks made in the spaces provided for free expressions. Change of social values is a complex and time taking phenomenon. The study shows that changes are in offing. It is now a matter of time.

RECOMMENDATIONS FOR ACTION

Based on the findings of the study recommendations for actions have been made in order to improve the situation. Some of these suggested corrective measures are educative in nature and some are regulatory. The educative measures are primarily concerned with the formulation and implementation of awareness programmes for parents, society and employers.

New and lesser-known courses are being started in engineering colleges all the time. Employers should be made aware of the names and contents of such courses. Special cells may be established on campus to provide professional help in career guidance. A regulatory requirement may need to be imposed on the colleges to have a certain minimum number of campus interviews and make sure that girls are not denied the opportunity to appear in the same. Colleges should make a deliberate effort to get as many employers as possible for campus interviews. 'Job Marts' organised by professional bodies and attended by employers could be an effective mode of employment for engineering graduates. It has also been suggested that number of centres of examinations and interviews be increased to ease the approach to the same, at least in the case of government jobs. A compulsory apprenticeship programme for experience and exposure to an industrial environment should be made a part of the curriculum. Colleges should have student chapters of reputed professional bodies on the campus to help in inculcating the culture of networking during the process of job seeking and later for career advancement.

In order to ensure increasing participation of women in the engineering profession, it has been recommended that industrial concerns be required to submit annually a record of employment of engineering staff with a specific mention of the number of women engineers employed. In any advertisement for jobs, a mandatory mention that the organisation is an 'equal opportunity employer' is recommended. Another regulatory measure that has been recommended is the presence of women members in interview boards. Every employer should have an organisational directive to avoid gender bias in the process of selection of engineering staff. Executives, both men and women, involved in the interviewing and recruitment process should be made aware of the legal implications of women being questioned differently at the interview.

The creation of physical facilities like working women's hostels and child care centres in major cities have also been suggested. As far as service rules are concerned, it has been recommended that married women engineers be eligible for long leave up to one year, twice in their working career, during the child bearing and caring period and that they be given the option of flexible working hours, part-time jobs and working from home, at least for some part of their working career The organisational policies should support employment of both husband and wife and their transfers together

Institution of scholarships and special awards for women has also emerged as an important recommendation to encourage their participation in the engineering profession and recognise their performance as engineering professionals. The National Commission of Women should take up the task of initiating the above mentioned approaches, monitoring their effectiveness and ensuring their implementation. Formation of a forum of women engineers, which takes up issues related with women engineers, has also been suggested. Such forums can take up organisation of meetings and workshops on various facets on the subject of women in engineering.