# Women Engineers in Malaysia

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**Abstract**

Traditionally the field of engineering had been male dominant, as women were perceived as not suitable to take up this mentally and physically challenging profession. Thus women's participation in the work force was only confined to the non-technical profession such as teachers, nurses and administrators. However, due to the equal opportunity for both genders in education in Malaysia, the participation and contributions of women in engineering field in the last few decades are invaluable. This paper discussed the progress of women in engineering from tertiary education up to professional level in Malaysia. The 21st century women engineers are known to exploit their potentials in engineering field even if it is physically demanding such as working in oil platform for petroleum engineering.

## Introduction

In most society, even in developed countries, the notion that women are only deemed fit to take up profession related to nurturing still persists. However, the National Education Policy in this country, which is based on merit rather than gender, has helped not only to change the perception of the Malaysian society on women in engineering but has also indirectly helped to increase the number of women engineers.

Malaysian's government open policy to provide education for all her citizen has resulted in both the male and female students being treated equally based on merit. Table 1 shows that in 1970, there were about 39 % of female having Lower Certificate of Education, 36 % having Malaysian Certificate of Education, 27 % having the Higher School Certificate, 22 % having University Degree and 38% having other certificate at tertiary level, [1]. During this era, most of the female students would opt for traditional non-technical courses and most of them would become teachers, nurses and administrators. Only a few took up the professional courses such as law, engineering and medicine.

The emergence of women taking technical course started in the seventies and the numbers then was relatively small. However, by the eighties due to increasing number of universities offering technical courses more women began enrolling in engineering courses. Table 2 compares the number of female and male students enrollment in the field of engineering from 1981 up to 1999, [2], [3], [4] and [5]. The percentage of female students enrolled in engineering course has risen from merely 5 % in 1981 to 30 % in 1999. The percentage of female students in university has increased by 6 fold in two decade. Despite the increasing number of female students in technical fields, the male dominance in the area of marine and aviation engineering is still expected to persist for a long time. This is as shown in Table 3 where only a few students registered in marine and aviation.

## Progress of Women in Engineering in Malaysia

Even in the developed nations, the number of women engineers are undeniably low. However, their roles as nation builders and their contributions towards development of the nation cannot be taken lightly. Thus it is not surprising for the significant emergence of women engineers in Malaysia only began in the seventies. The earliest data available on the number of women graduating in engineering field were reported by Social Statistics Bulletin Malaysia in 1981 [2]. Even though it is believed the number were higher, only 8 women were reported to have graduated in 1981. Table 3 compares the number of female to male graduate in the field in engineering from 1981 to 1991. The percentage of female graduate in engineering course has risen from 3% in 1981 to 28% in 1991.

Numbers of enrollment and graduation as shown in Table 2 and Table 3, respectively, shows that most women in engineering prefer career in civil, electrical and chemical

*Table 1: Number of persons holding certificate, diploma, degree and others in Peninsular Malaysia, 1970, [1]*

| | Lower Cert. of Education or equivalent | Malaysian Cert. of Education or equivalent | Higher School Cert. of Education or equivalent | University Degree | Other certificate at other tertiary Level |
|---|---|---|---|---|---|
| Male | 73633 | 119510 | 26318 | 9675 | 14153 |
| Female | 46761 | 68472 | 9680 | 2801 | 8786 |
| Total | 120394 | 187982 | 35998 | 12476 | 22939 |
| Percentage (Female) | 39% | 36% | 27% | 22% | 38 % |

*Table 2: Students enrollment in engineering courses [2], [3], [4] and [5].*

| Year | Civil | | Electrical | | Mechanical | | Chemical | | Petroleum | | Marine | | Aviation | | Agriculture | | Industrial | | Computer | | Tech. Management | | Material & Mineral Sciences | | Gas/ Bioprocess/ Polymer | | Others | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Year | M | F | M | F | M | F | M | F | M | F | M | F | M | F | M | F | M | F | M | F | M | F | M | F | M | F | M | F |
| 1981 | 955 | 56 | 212 | 19 | 233 | 4 | - | - | 83 | 1 | 27 | - | - | - | 116 | 6 | - | - | - | - | - | - | - | - | - | - | - | - |
| 1982 | 1047 | 57 | 245 | 29 | 290 | 6 | - | - | 96 | - | 38 | - | - | - | 115 | 10 | - | - | - | - | - | - | - | - | - | - | - | - |
| 1983 | 1114 | 72 | 280 | 39 | 368 | 5 | 17 | 9 | 109 | - | 64 | - | 40 | - | 139 | 12 | - | - | - | - | - | - | - | - | - | - | - | - |
| 1984 | 1241 | 88 | 313 | 48 | 447 | 7 | 43 | 16 | 134 | - | 80 | - | 71 | - | 26 | 1 | - | - | - | - | - | - | - | - | - | - | - | - |
| 1985 | 1559 | 150 | 358 | 66 | 501 | 14 | 63 | 18 | 132 | - | 81 | - | 73 | - | 51 | 3 | 205 | 52 | 25 | 5 | -- | - | - | - | - | - | - | - |
| 1986 | 2032 | 248 | 431 | 88 | 511 | 17 | 80 | 26 | 124 | - | 76 | - | 69 | - | 110 | 7 | 74 | 63 | 47 | 3 | - | - | - | - | - | - | - | - |
| 1987 | 946 | 185 | 729 | 119 | 760 | 61 | 217 | 88 | 164 | 4 | 84 | - | 100 | - | 102 | 4 | 161 | 101 | 214 | 27 | na | - | na | na | na | na | 340 | 65 |
| 1988 | 973 | 138 | 678 | 115 | 763 | 64 | 240 | 70 | 141 | - | 95 | - | 106 | - | 96 | 22 | 217 | 140 | 197 | 38 | 72 | 36 | na | na | na | na | 645 | 90 |
| 1989 | 887 | 149 | 988 | 150 | 898 | 76 | 271 | 78 | 146 | 8 | 101 | - | 99 | - | 90 | 12 | 154 | 138 | 125 | 14 | 89 | 57 | na | na | na | na | 435 | 69 |
| 1990 | 923 | 181 | 1043 | 148 | 970 | 85 | 293 | 103 | 129 | 10 | 109 | - | 115 | - | 96 | 13 | 180 | 147 | 128 | 20 | 120 | 79 | 104 | 21 | na | na | 397 | 60 |
| 1991 | 998 | 196 | 1152 | 157 | 1094 | 112 | 330 | 108 | 142 | 19 | 123 | - | 132 | - | 92 | 12 | 177 | 158 | 146 | 23 | 164 | 101 | 110 | 28 | na | na | 518 | 100 |
| 1992 | 1022 | 205 | 1185 | 167 | 1155 | 99 | 326 | 118 | 138 | 22 | 99 | - | 131 | - | 90 | 19 | 188 | 152 | 157 | 33 | 188 | 101 | 133 | 39 | na | na | 569 | 129 |
| 1993 | 1097 | 228 | 1287 | 200 | 1273 | 98 | 351 | 146 | 140 | 25 | 95 | - | 145 | - | 124 | 22 | 200 | 180 | 162 | 31 | 241 | 121 | 155 | 55 | na | na | 623 | 130 |
| 1994 | 1277 | 281 | 1452 | 372 | 1606 | 116 | 394 | 177 | 153 | 28 | 93 | - | 125 | 2 | 128 | 29 | 200 | 177 | 200 | 57 | 281 | 139 | 173 | 72 | na | na | 821 | 204 |
| 1995 | 1479 | 392 | 1629 | 442 | 1769 | 187 | 474 | 229 | 170 | 29 | 104 | - | 139 | 6 | 183 | 47 | 217 | 181 | 204 | 75 | 335 | 157 | 191 | 86 | 335 | 127 | 600 | 201 |
| 1996 | 1736 | 813 | 1940 | 608 | 1719 | 239 | 579 | 363 | 193 | 32 | 108 | - | 226 | 14 | 173 | 38 | 268 | 202 | 363 | 187 | 386 | 197 | 221 | 111 | 402 | 146 | 1067 | 334 |
| 1997 | 2363 | 655 | 2698 | 1014 | 2266 | 291 | 699 | 514 | 219 | 39 | 150 | - | 342 | 27 | 177 | 38 | 318 | 231 | 430 | 265 | 1017 | 543 | 323 | 157 | 484 | 201 | 1510 | 619 |
| 1998 | 3087 | 1043 | 3581 | 1434 | 2737 | 350 | 863 | 756 | 267 | 58 | 188 | 2 | 505 | 52 | 188 | 56 | 373 | 273 | 591 | 390 | 1067 | 621 | 445 | 231 | 547 | 260 | 1938 | 1047 |
| 1999 | 3241 | 1187 | 3932 | 1615 | 2877 | 384 | 970 | 914 | 275 | 66 | 197 | 3 | 603 | 91 | 173 | 55 | 472 | 408 | 559 | 428 | 1113 | 747 | 442 | 273 | 551 | 305 | 2062 | 1249 |

Note: M = Male Students
F = Female Students

*Table 3: Number of university graduates (1st Degree) in engineering course, 1981-1999, [2], [3], [4] and [5]*

| Year | Civil | | Electrical | | Mechanical | | Chemical | | Petroleum | | Marine | | Aviation | | Agriculture | | Industrial | | Computer | | Tech. Management | | Material & Mineral Sciences | | Gas/ Bioprocess/ Polymer | | Others | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Year | M | F | M | F | M | F | M | F | M | F | M | F | M | F | M | F | M | F | M | F | M | F | M | F | M | F | M | F |
| 1981 | 160 | 2 | 19 | 2 | 20 | 2 | - | - | 13 | - | - | - | - | - | 16 | 2 | - | - | - | - | - | - | - | - | - | - | - | - |
| 1982 | 151 | 7 | 17 | - | 13 | - | - | - | 4 | - | - | - | - | - | 29 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 1983 | 165 | 8 | 34 | 5 | 22 | - | - | - | 14 | - | - | - | - | - | 23 | 1 | - | - | - | - | - | - | - | - | - | - | - | - |
| 1984 | 179 | 9 | 37 | 4 | 15 | - | - | - | 3 | - | - | - | - | - | 20 | 4 | - | - | - | - | - | - | - | - | - | - | - | - |
| 1985 | 215 | 17 | 32 | 5 | 16 | - | - | - | 8 | - | - | - | - | - | 32 | 1 | - | - | - | - | - | - | - | - | - | - | - | - |
| 1986 | 189 | 20 | 100 | 12 | 126 | 4 | 26 | 1 | - | - | 4 | - | 8 | - | 36 | 3 | - | - | - | - | - | - | - | - | - | - | - | - |
| 1987 | na | na | na | na | na | na | na | na | na | na | na | na | na | na | na | na | na | na | na | na | na | - | na | - | na | - | na | na |
| 1988 | 180 | 17 | 116 | 17 | 134 | - | 29 | 9 | 26 | - | 10 | - | 8 | - | 30 | 1 | 15 | 8 | - | - | - | - | - | - | - | - | 77 | - |
| 1989 | 198 | 17 | 152 | 296 | 135 | 13 | 39 | - | 9 | - | 15 | - | 21 | - | 21 | - | 13 | 9 | - | 2 | - | - | - | - | - | - | 81 | 13 |
| 1990 | 169 | 27 | 147 | 40 | 120 | 3 | 40 | 9 | 21 | - | 11 | - | 18 | - | 12 | - | 23 | 25 | 26 | 1 | - | - | - | - | - | - | 92 | 15 |
| 1991 | 201 | 32 | 166 | 31 | 130 | 9 | 41 | 11 | 22 | - | 14 | - | 13 | - | 16 | 4 | 40 | 31 | 18 | 1 | - | - | - | - | - | - | 85 | 16 |
| 1992 | 188 | 32 | 178 | 36 | 168 | 21 | 65 | 11 | 20 | - | 16 | - | 14 | - | 17 | 3 | 24 | 37 | 14 | 1 | - | - | - | - | - | - | 110 | 28 |
| 1993 | 182 | 39 | 198 | 32 | 188 | 25 | 81 | 15 | 38 | - | 12 | - | 18 | - | 8 | 3 | 45 | 32 | 30 | 7 | 21 | 7 | 29 | 24 | - | - | 80 | 24 |
| 1994 | 173 | 55 | 195 | 31 | 188 | 17 | 73 | 21 | 16 | 3 | 19 | - | 20 | - | 19 | 3 | 44 | 35 | 42 | 9 | 29 | 4 | 29 | 16 | - | - | 121 | 11 |
| 1995 | 193 | 40 | 210 | 36 | 225 | 18 | 78 | 12 | 23 | 7 | 18 | - | 16 | - | 16 | 2 | 43 | 35 | 38 | 5 | 28 | 13 | 32 | 22 | - | - | 96 | 8 |
| 1996 | 215 | 42 | 167 | 24 | 254 | 37 | 57 | 28 | 20 | 5 | 19 | - | 19 | - | 14 | 5 | 43 | 35 | 29 | 15 | 28 | 13 | 41 | 23 | 51 | 22 | 87 | 13 |
| 1997 | 287 | 67 | 288 | 63 | 309 | 14 | 70 | 49 | 22 | 3 | 6 | - | 24 | - | 25 | 13 | 38 | 51 | 45 | 5 | 36 | 22 | 129 | 29 | 33 | 13 | 138 | 19 |
| 1998 | 216 | 51 | 267 | 98 | 218 | 24 | 61 | 40 | 15 | 1 | 10 | - | 17 | - | 41 | 10 | 52 | 39 | 25 | 12 | 48 | 23 | 226 | 89 | 24 | 10 | 640 | 119 |
| 1999 | 585 | 164 | 469 | 196 | 474 | 31 | 163 | 163 | 29 | 4 | 3 | - | 22 | - | 69 | 13 | 93 | 77 | 112 | 80 | 80 | 47 | 106 | 67 | 65 | 31 | 542 | 230 |

Note: M = Male Students
F = Female Students

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*Table 4: Number of men (M) and women (W) Engineers registered with IEM since 1969.*

| | 1969 | | 1979 | | 1989 | | 1999 | | 2003 | | Total | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | M | W | M | W | M | W | M | W | M | W | M | W |
| Civil | 249 | 0 | 719 | 8 | 2667 | 55 | 2299 | 155 | 1057 | 235 | 6991 | 453 |
| Electrical | 71 | 0 | 289 | 4 | 744 | 42 | 877 | 50 | 371 | 46 | 2352 | 142 |
| Mechanical | 25 | 0 | 308 | 0 | 829 | 4 | 925 | 20 | 586 | 53 | 2673 | 77 |
| Electronic | 0 | 0 | 1 | 0 | 23 | 1 | 141 | 10 | 245 | 79 | 410 | 90 |
| Chemical | 0 | 0 | 26 | 0 | 87 | 11 | 152 | 38 | 121 | 153 | 386 | 202 |
| Other | 6 | 0 | 23 | 1 | 169 | 2 | 146 | 15 | 112 | 52 | 456 | 70 |
| Total | 351 | 0 | 1366 | 13 | 4519 | 115 | 4540 | 288 | 2492 | 618 | 13268 | 1034 |

engineering compared to a career in mechanical and petroleum engineering. The reason is that the courses are less physically demanding and the work environment is more conducive for women.

Table 4 shows the number of women and men engineer registered with IEM from 1969 to 2003. In 1969 there is no woman engineer compared to 351 men engineer. In 1979 the percentage of women engineer registered with IEM is 1%. The number has risen steadily to 20% in 2003, which is approximately 20 fold within 2 decade.

The 21st century has seen women engineers in Malaysia involved in the construction of important projects in Malaysia such as KLCC and KLIA.

## The Future of Women Engineers

In the era of globalisation and knowledge based economy, women engineers are continuously challenged to contribute towards nation building while maintaining balance in the personal life and at the same time acquiring intellectually challenging and rewarding life-long career. Besides being a career minded individual, women engineers still have to fulfill their social obligations and responsibility towards family. It is pertinent that women engineers in Malaysia do not loose sight of their femininity and still upheld their expected roles in the society such as getting married and bearing children.

Development in multi-disciplinary areas of engineering and related disciplines such as nanotechnology, biotechnology, genetic engineering, information technology, communication technology bring new challenges. Women engineers will have to keep abreast on new technologies continuously. Continuous personal development in non-technical areas such as management and financial planning is necessary if one is to be marketable in the industry.

The new challenge ahead is for women engineers to go global. We have succeeded in exporting workers in the non-technical field; for example, well-trained Malaysian nurses are much sought after by the middle-east countries. The challenge is also to export our services in engineering. However, this seems to be arduous task where even the men engineers have encountered difficulties in going global.

## Conclusions

Women engineers in Malaysia have come a long way in earning due respect and recognition for their efforts and contributions towards nation building from the society. The future of women engineers in the 21st century is bright if the current atmosphere such as equal opportunity and political stability is maintained. One of the determining factors for Malaysia to achieve Vision 2020 will be contribution from women engineers. Women engineers will be among the main backbone in supplying the advance technical knowledge in transforming Malaysia into a develop-ed country. ■

**References**


[1] Social Statistics Bulletin Peninsular Malaysia 1978-1979, Statistics Department, Government of Malaysia, Mac 1982. p. 109.

[2] Social Statistics Bulletin Malaysia 1985, Statistics Department, Government of Malaysia, April 1987, p. 136 and p. 140.

[3] Social Statistics Bulletin Malaysia 1989, Statistics Department, Government of Malaysia, July 1991. p. 115 and p. 117.

[4] Social Statistics Bulletin Malaysia 1994, Statistics Department, Government of Malaysia, May 1996. p. 142 and p. 145.

[5] Social Statistics Bulletin Malaysia 2001, Statistics Department, Government of Malaysia, Feb 2002. p. 158 and p. 161.