

Chapter 4

Statistical Analysis

4.1 Factor analysis

The factor analysis is used to reduce the dimensionality of the multivariate outcomes. There are 307 observations corresponding to 39 outcomes in our data. In this analysis, missing values are replaced by the mean value for each outcome variable if that variable had only a few missing values, otherwise they were ignored altogether.

In this study we used the maximum likelihood method for factor extraction with varimax rotation to obtain a pattern of loadings. SPSS was used to do this. Four of the questionnaire items did not contribute to the factor analysis because of poor uniqueness coefficients. These were *number of credits*, *activities*, *evaluation and measurement*, and *up-to-date program*. According to the goodness-of-fit criterion available in maximum likelihood estimation, eleven factors were extracted.

The results are shown in Tables 4.1 and 4.2. Loadings higher than 0.400 are highlighted in bold. The summary of this analysis is shown in Table 4.3.

Factor one comprises relationships among student, with classmates, participation among classmates, exclusive knowledge among classmates and helping each other. Factor two comprises the lecturers' knowledge, attempt and prepare to teach, and expertise. Factor three comprises how well known are the university, faculties, department or program and lecturers. Factor four comprises the sufficiency of the library, computer services and laboratory equipment. Factor five is concerned with equipment, technology use for teaching, laboratory and up-to-date equipment. Factor six comprises the university, student and teaching management system and the beauty of the buildings and environment. Factor seven comprises the subjects and content in the program. Factor eight comprises usefulness in daily life and human needs in the program. Factor nine comprises relationships between lecturers and students and good characteristics of lecturers. Factor ten comprises the depth of content in the subject and the depth of teaching about the subject. The last factor comprises environment and classroom and participation in group work.

| Outcomes/ Satisfaction of | Factor loadings | | | | |
|--------------------------------------|-----------------|-------------|-------------|-------------|-------------|
| | Factor 1 | Factor 2 | Factor 3 | Factor 4 | Factor 5 |
| Major in master degree | .007 | .181 | .173 | .072 | .124 |
| Subject in program | .063 | .128 | .146 | .055 | .103 |
| Content in program | .027 | .167 | .257 | .102 | .193 |
| The dept of content in subject | .056 | .368 | .183 | .114 | .216 |
| Useful in daily life | .137 | .227 | .251 | .085 | .069 |
| Human need in program | .052 | .176 | .161 | .118 | .046 |
| Knowledge of lecturer | .072 | .735 | .157 | .170 | .135 |
| Attempt to teach of lecturer | .037 | .766 | .169 | .043 | .184 |
| Expert of lecturer | .095 | .771 | .139 | .138 | .175 |
| Relationship (lecturer and student) | .212 | .274 | .134 | .086 | .173 |
| A good characteristics of lecturer | .120 | .366 | .222 | .055 | .149 |
| Equipment | .101 | .243 | .030 | .248 | .667 |
| Prepare of lecturer | .161 | .416 | .120 | .126 | .399 |
| Teaching technique | .160 | .355 | .137 | .184 | .380 |
| How to use technology for teaching | .088 | .219 | .108 | .202 | .625 |
| The dept of teaching about subject | .074 | .384 | .161 | .053 | .253 |
| Environment and classroom | -.025 | .208 | .066 | .178 | .319 |
| Participation in group working | .380 | .108 | .121 | .089 | .045 |
| The library resource sufficiency | .039 | .157 | .072 | .755 | .089 |
| Computer service sufficiency | .050 | .078 | .070 | .849 | .202 |
| Lab equipments | .136 | .119 | .080 | .664 | .459 |
| Relationship among student | .814 | .077 | .034 | .095 | .030 |
| Relationship with classmates | .877 | .136 | .036 | .021 | .077 |
| Participation among classmate | .839 | -.014 | .076 | .028 | .073 |
| Exclusive knowledge among classmate | .836 | .018 | .075 | .083 | .061 |
| Helping each other | .848 | .069 | .125 | .011 | .037 |
| University's reputation | .116 | .160 | .652 | .063 | .030 |
| Faculty's reputation | .116 | .123 | .862 | .070 | .098 |
| Department's reputation | .096 | .155 | .746 | .057 | .083 |
| Lecturer's reputation | .122 | .308 | .527 | .172 | .180 |
| Up to date of equipment | .071 | .131 | .192 | .348 | .553 |
| Lecturer scholarly | .088 | .316 | .350 | .256 | .192 |
| University management system | .095 | .156 | .246 | .271 | .196 |
| Study and teaching management system | .119 | .233 | .226 | .230 | .198 |
| The beauty of building/environment | .019 | .068 | .279 | .131 | .201 |

Table 4.1: The loadings for the first five factors

| Outcomes/ Satisfaction of | Factor loadings | | | | | |
|-------------------------------------|-----------------|-------------|-------------|-------------|--------------|--------------|
| | Factor 6 | Factor 7 | Factor 8 | Factor 9 | Factor 10 | Factor 11 |
| Major in master degree | .031 | .417 | .329 | .126 | .065 | .051 |
| Subject in program | .143 | .930 | .187 | .054 | .011 | .077 |
| Content in program | .118 | .644 | .144 | .165 | .219 | .013 |
| The dept of content in subject | .142 | .249 | .171 | .095 | .435 | .005 |
| Useful in daily life | .070 | .212 | .569 | .104 | .119 | .085 |
| Human need in program | .132 | .222 | .917 | .103 | .062 | -.023 |
| Knowledge of lecturer | .172 | .148 | .113 | .165 | .047 | .057 |
| Attempt to teach of lecturer | .103 | .133 | .158 | .194 | .103 | .105 |
| Expert of lecturer | .108 | .065 | .121 | .130 | .098 | .047 |
| Relationship (lecturer and student) | .087 | .151 | .106 | .632 | -.011 | .079 |
| A good characteristics of lecturer | .108 | .113 | .124 | .635 | .151 | .055 |
| Equipment | .240 | .142 | -.004 | .129 | .079 | .053 |
| Prepare of lecturer | .146 | .158 | .121 | .320 | .192 | .132 |
| Teaching technique | .135 | .141 | .210 | .384 | .188 | .059 |
| How to use technology for teaching | .135 | .121 | .078 | .173 | .096 | .090 |
| The dept of teaching about subject | .165 | .213 | .194 | .165 | .630 | .200 |
| Environment and classroom | .250 | .135 | .043 | .114 | .112 | .400 |
| Participation in group working | .039 | .051 | .029 | .070 | .053 | .709 |
| The library resource sufficiency | .185 | .054 | .101 | .108 | .018 | .153 |
| Computer service sufficiency | .153 | .076 | .063 | .039 | .047 | .000 |
| Lab equipments | .202 | .042 | .045 | .007 | .031 | .027 |
| Relationship among student | .030 | .082 | .117 | .079 | .057 | .096 |
| Relationship with classmates | .026 | -.001 | -.030 | .016 | .023 | .037 |
| Participation among classmate | .083 | .001 | .002 | .030 | .011 | .061 |
| Exclusive knowledge among classmate | .015 | -.037 | .073 | .120 | .032 | .081 |
| Helping each other | .063 | .087 | .054 | .094 | -.009 | .039 |
| University's reputation | .296 | .153 | .053 | .157 | .044 | -.002 |
| Faculty's reputation | .176 | .145 | .150 | .081 | .061 | .063 |
| Department's reputation | .155 | .142 | .192 | .075 | .071 | .112 |
| Lecturer's reputation | .163 | .104 | .088 | .115 | .069 | .042 |
| Up to date of equipment | .382 | .130 | .078 | .015 | .046 | -.035 |
| Lecturer scholarly | .317 | .124 | .139 | .157 | .088 | -.070 |
| University management system | .729 | .083 | .098 | .069 | .069 | .011 |
| Study/teaching management system | .731 | .097 | .113 | .090 | .137 | .058 |
| The beauty of building/environment | .562 | .109 | .041 | .071 | -.004 | .114 |

Table 4.2: The loadings for the remaining six factors

| Factor | Component | | | | |
|--------|-------------------------------------|------------------------------------|-------------------------------------|------------------------------|--------------------|
| | 1 | 2 | 3 | 4 | 5 |
| 1 | Relationship among student | Relationship with classmates | Participation among classmate | Exclusive kn among classmate | Helping each other |
| 2 | Knowledge of lecturer | Attempt to teach of lecturer | Expert of lecturer | Prepare of lecturer | |
| 3 | University's reputation | Faculty's reputation | Department's reputation | Lecturer's reputation | |
| 4 | The library resource sufficiency | Computer service sufficiency | Lab equipments | | |
| 5 | Equipment | How to use technology for teaching | Lab equipments | Up to date of equipment | |
| 6 | University management system | Study/teaching management system | The beauty of building/ environment | | |
| 7 | Major in Master degree | Subject in program | Content in program | | |
| 8 | Useful in daily life | Human need in program | | | |
| 9 | Relationship (lecturer and student) | A good characteristics of lecturer | | | |
| 10 | The dept of content in subject | The dept of teaching about subject | | | |
| 11 | Environment and classroom | Participation in group working | | | |

Table 4.3: Summary of factor analysis of satisfaction outcomes

It can be seen that factor one relates to friendliness of classmates, factor two relates to teacher expertise, factor three relates to prestige of institute, factor four relates to good facilities, factor five relates to good technology, factor six relates to good management, factor seven relates to good curricula, factor eight relates to having a practical program, factor nine relates to friendly teachers, factor ten relates to good teaching and the last factor relates to good environment.

In the next sections we report the associations between the outcomes and the student-based determinants.

4.2 Individual Associations between Outcomes and Student Characteristics

Next we will look at the relationship between the eleven factors and the specified determinants using linear regression analysis. The results are shown in Table 4.4.

| determinant | Friendly Class-mates | Expert Teacher | Well-known Institute | Good Facilities | Good Technology | Good Management |
|----------------------|----------------------|----------------|----------------------|-----------------|-----------------|-----------------|
| major group | 0.599 | 0.000 | 0.000 | 0.000 | 0.001 | 0.001 |
| program | 0.854 | 0.593 | 0.066 | 0.000 | 0.053 | 0.317 |
| gender | 0.993 | 0.079 | 0.690 | 0.729 | 0.770 | 0.639 |
| marital status | 0.323 | 0.117 | 0.157 | 0.540 | 0.967 | 0.480 |
| age group | 0.080 | 0.349 | 0.013 | 0.152 | 0.720 | 0.164 |
| occupational status | 0.543 | 0.102 | 0.245 | 0.015 | 0.519 | 0.927 |
| research experience | 0.494 | 0.152 | 0.186 | 0.368 | 0.506 | 0.323 |
| prior knowledge | 0.841 | 0.542 | 0.525 | 0.014 | 0.026 | 0.108 |
| computer skill | 0.409 | 0.125 | 0.162 | 0.609 | 0.603 | 0.975 |
| Eng search skill | 0.616 | 0.834 | 0.066 | 0.011 | 0.285 | 0.256 |
| article search skill | 0.322 | 0.679 | 0.639 | 0.477 | 0.199 | 0.165 |
| problems | 0.837 | 0.785 | 0.040 | 0.684 | 0.269 | 0.345 |
| thesis timing | 0.735 | 0.457 | 0.074 | 0.000 | 0.030 | 0.176 |
| time taken | 0.103 | 0.179 | 0.006 | 0.433 | 0.538 | 0.131 |

| determinant | Good Curriculum | Practical Program | Friendly Teacher | Good Teaching | Good Environment |
|----------------------|-----------------|-------------------|------------------|---------------|------------------|
| major group | 0.002 | 0.002 | 0.000 | 0.040 | 0.653 |
| program | 0.392 | 0.914 | 0.314 | 0.411 | 0.196 |
| gender | 0.207 | 0.363 | 0.154 | 0.510 | 0.098 |
| marital status | 0.182 | 0.180 | 0.099 | 0.525 | 0.634 |
| age group | 0.040 | 0.004 | 0.194 | 0.822 | 0.056 |
| occupational status | 0.451 | 0.245 | 0.220 | 0.916 | 0.152 |
| research experience | 0.279 | 0.117 | 0.295 | 0.479 | 0.301 |
| prior knowledge | 0.145 | 0.160 | 0.454 | 0.118 | 0.198 |
| computer skill | 0.254 | 0.368 | 0.143 | 0.155 | 0.297 |
| Eng search skill | 0.767 | 0.042 | 0.995 | 0.718 | 0.169 |
| article search skill | 0.052 | 0.846 | 0.662 | 0.923 | 0.475 |
| problems | 0.513 | 0.477 | 0.195 | 0.437 | 0.209 |
| thesis timing | 0.013 | 0.593 | 0.090 | 0.073 | 0.150 |
| time taken | 0.862 | 0.613 | 0.164 | 0.955 | 0.040 |

Table 4.4: P-values relating factor variables to determinants using regression analyses

Each p-value is obtained by carrying out a separate regression analysis. The table also includes on the bottom line the p-values for the associations between the main outcome variable (the time to completion of the degree) and the satisfaction factors. For the categorical determinants, this analysis is equivalent to a one-way analysis of variance.

Given that 154 statistical tests are conducted simultaneously, the p-value needed to reject the null hypothesis for each one should be $0.05/154 = 0.00033$ to allow for multiplicity. Thus, despite having p-values less than 0.05, there is insufficient evidence for associations between *good technology* and major group, *good management* and major group, *good facilities* and occupational status, prior knowledge, or English search skill, *well known institute* and age group, problems, or time taken, *good technology* and thesis timing, *good curriculum* and major group, age group, or thesis timing, *practical program* and major group, age group, or English search skill, *good teaching* and major group, or between *good environment* and time taken.

However, there are associations between four of the satisfaction factors and three of the student-based determinants. *Expert teacher* is associated with major group, *well known institute* and major group are associated, *good facilities* is associated with major group, program, and thesis timing, *friendly teacher* is associated with major group.

Figure 4.1 shows box plots and 95% confidence intervals for means illustrating the association between the *expert teacher* factor and major group. In this graph, pairs of points denoting the means are joined by thin lines whenever the corresponding pairwise comparison is not statistically significant at the 5% level according to the Kramer-Tukey criterion (Cheung and Chen, 1996). The main source of the comparative difference is due to the relatively low score achieved by the MBA major.

Similarly, Figure 4.2 shows box plots and 95% confidence intervals for means illustrating the association between the *well known institute* factor and major group. We see that the main source of the comparative difference is due to the relatively high scores achieved by the education and nursing majors.

Figure 4.3 shows box plots and 95% confidence intervals for means illustrating the association between the *good facilities* factor and major group. We see that the main source of the comparative difference is due to the relatively low scores achieved by the MBA major.

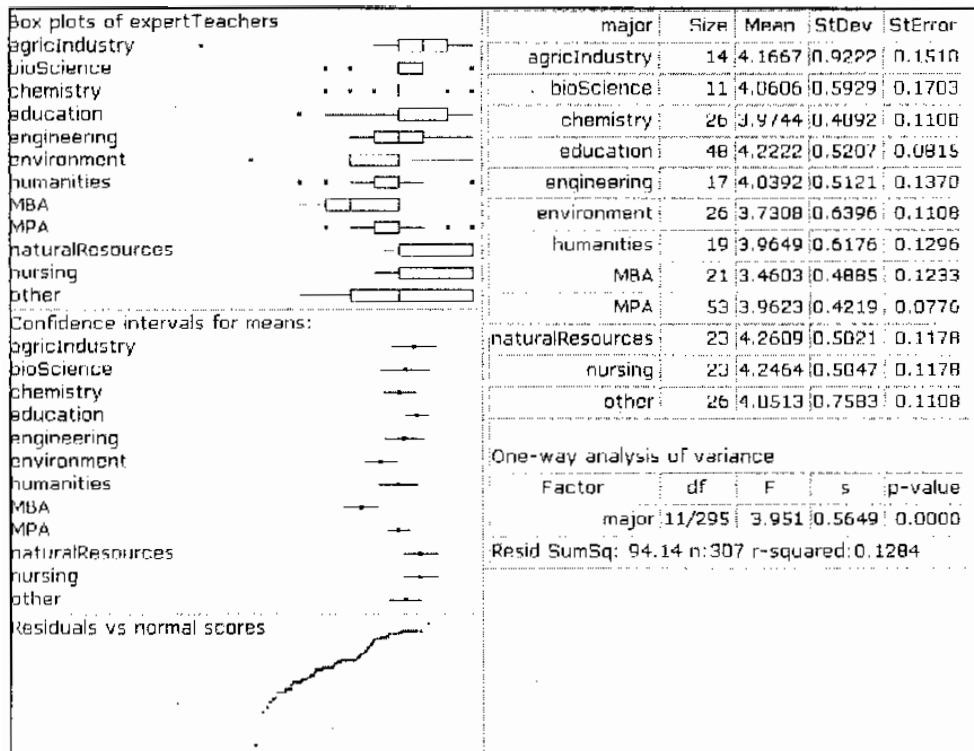


Figure 4.1: Association between *expert teacher* factor and major group

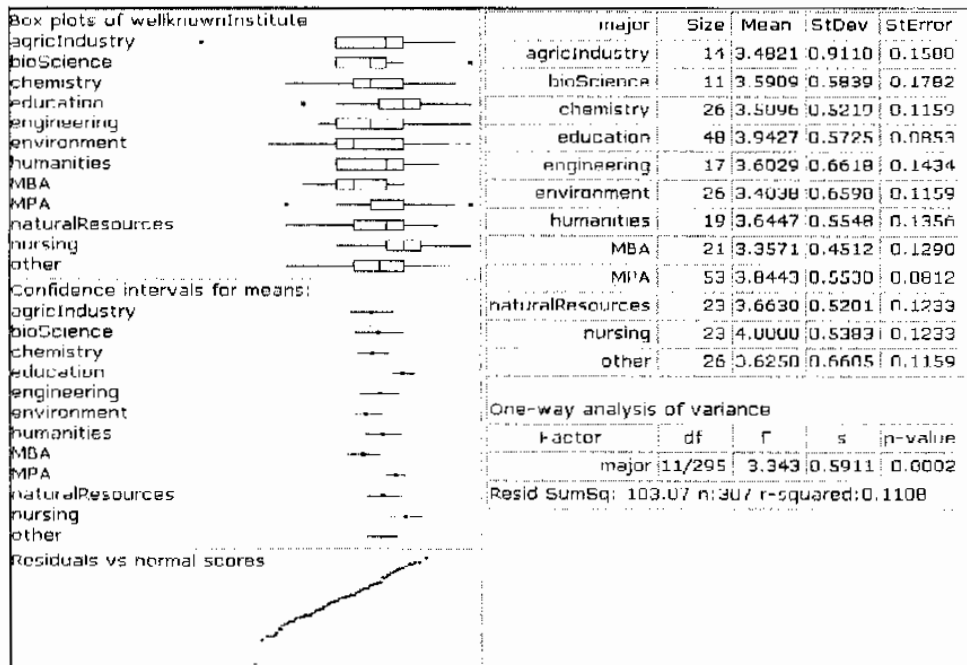


Figure 4.2: Association between *well known institute* factor and major group

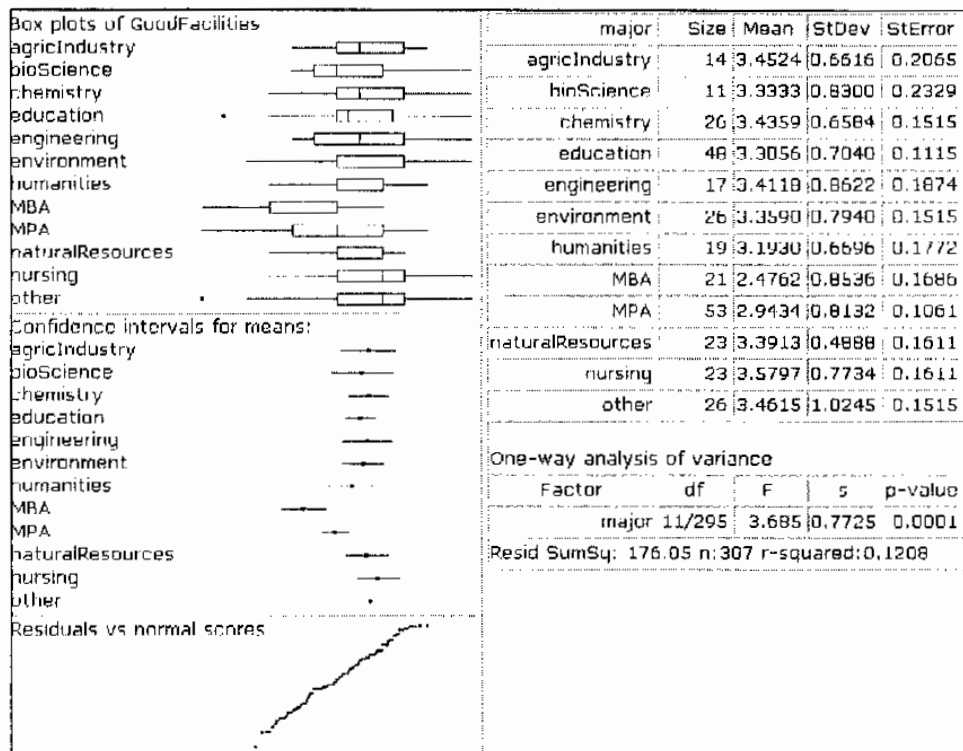


Figure 4.3: Association between the *good facilities* factor and major group

Figure 4.4 shows box plots and 95% confidence intervals for means illustrating the association between *good facilities* and program. Thus we see that the level of satisfaction for *good facilities* is higher (by approximately half a unit on the scale from “medium” to “much”) for graduates who studied full time.

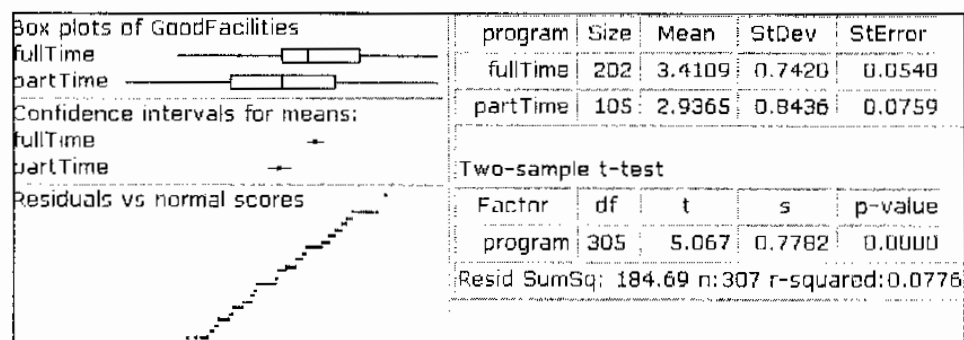


Figure 4.4: Association between the *good facilities* factor and program

Figure 4.5 shows box plots and 95% confidence intervals for means illustrating the association between *good facilities* and thesis timing. Thus we see that the graduates who were not required to complete a thesis had the lowest scores on this factor, whereas

those who studied continuously scored the highest on average, with half a point on the scale separating these extremes.

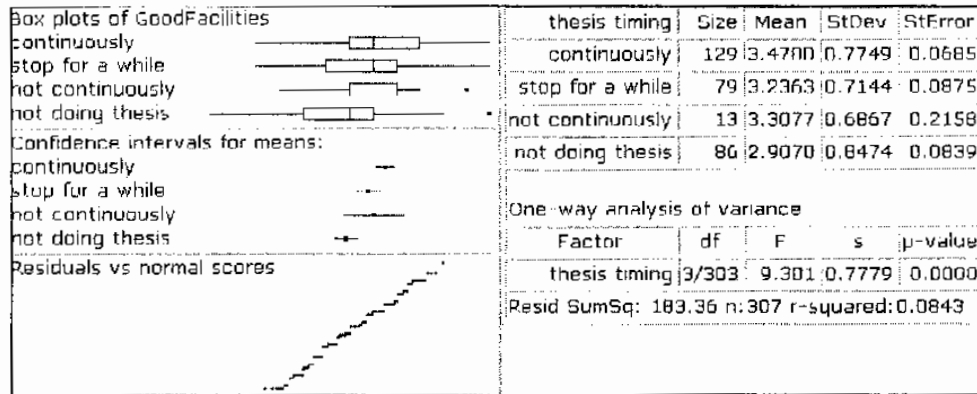


Figure 4.5: Association between the *good facilities* and thesis timing

Figure 4.6 shows box plots and 95% confidence intervals for means illustrating the association between the *friendly teacher* and major group. We see that the main source of the comparative difference is due to the relatively low scores achieved by the environment and MBA majors.

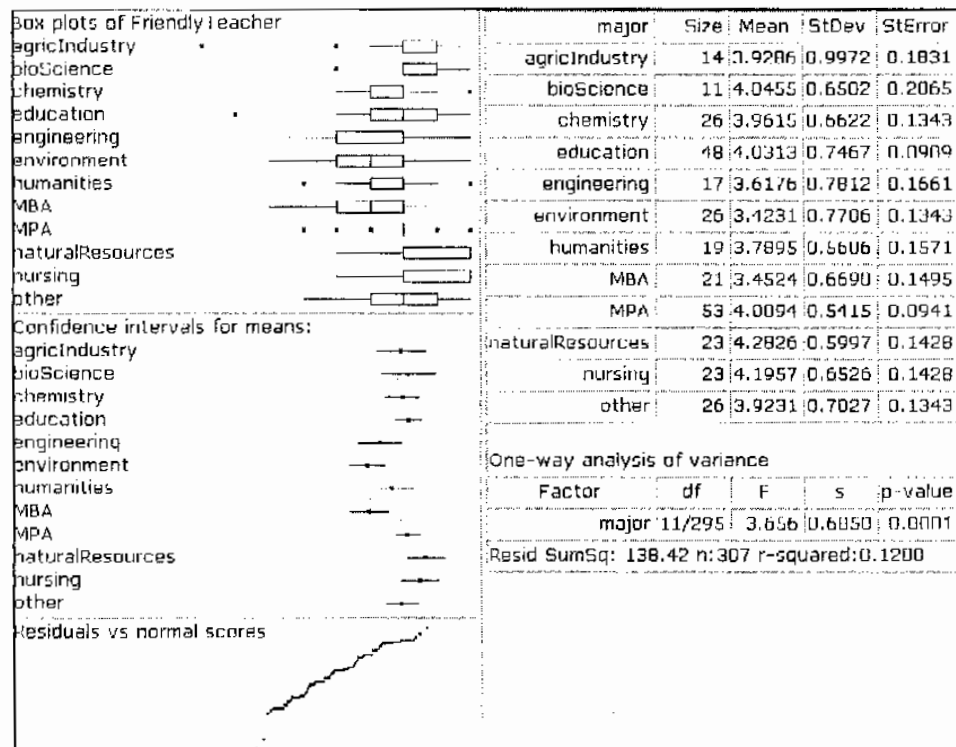


Figure 4.6: Association between the *friendly teacher* and major group

Table 4.5 shows the results of the statistical hypothesis tests for no association between the time to completion and each student-based determinant.

| Determinant | Test statistics | | df | P-value |
|--|-----------------|--------|--------|--------------|
| | t-test | F-test | | |
| major group | | 16.025 | 11/295 | 0.000 |
| program | 7.581 | | 305 | 0.000 |
| gender | 0.606 | | 305 | 0.545 |
| marital status | | 0.499 | 3/303 | 0.684 |
| age group | | 4.589 | 2/304 | 0.011 |
| occupational status | | 4.527 | 3/303 | 0.004 |
| prior research experience | | 0.913 | 3/303 | 0.435 |
| prior knowledge | | 0.673 | 3/303 | 0.569 |
| computer skill | | 0.618 | 2/304 | 0.540 |
| English search skill | | 4.491 | 3/303 | 0.004 |
| article search skill (other institute) | | 2.680 | 2/304 | 0.070 |
| problems (family etc.) | 3.939 | | 305 | 0.000 |
| thesis timing | | 19.708 | 2/218 | 0.000 |

Table 4.5: Tests for no association between completion and student-based determinants

Given that 13 statistical tests are conducted simultaneously, the p-value needed to reject the null hypothesis for each one should be $0.05/13 = 0.0038$ to allow for multiplicity.

Thus there is insufficient evidence for an association between completion time and age group. However, there is an association between completion time and six of the student-based determinants, namely, major group, program, occupational status, English search skill, problems, and thesis timing.

Figure 4.7 shows box plots and 95% confidence intervals for means illustrating the association between completion time and major group. We see that the MPA, MBA and nursing majors take less time to complete their degrees than those doing humanities, natural resources, and other miscellaneous majors, and humanities majors take longer than all other graduates.

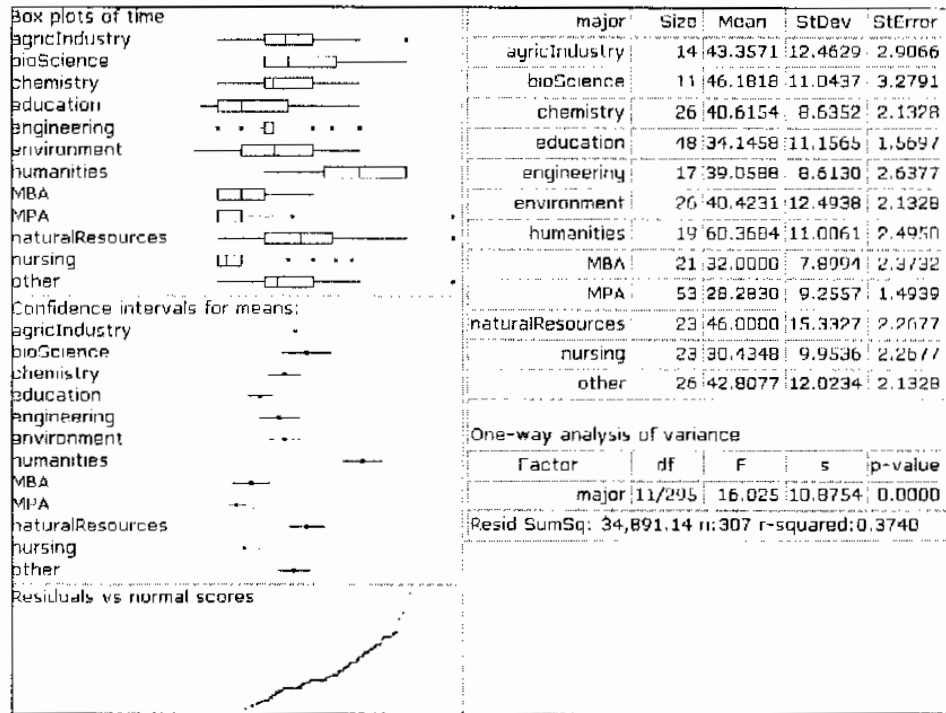


Figure 4.7: Association between completion time and major group

Figure 4.8 shows box plots and 95% confidence intervals for means illustrating the association between completion time and program. We see that the part time program take less time to complete their degrees than full time program.

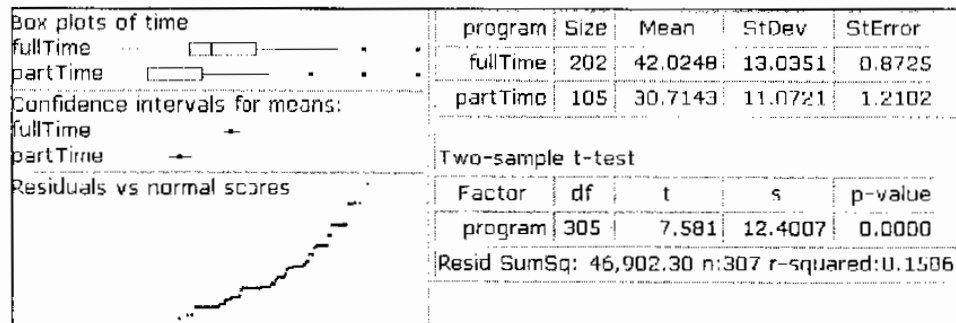


Figure 4.8: Association between completion time and program

Figure 4.9 shows box plots and 95% confidence intervals for means illustrating the association between completion time and occupational status. We see that the graduates with unknown occupational status take less time to complete their degrees than those who were unemployed or with part time occupational status.

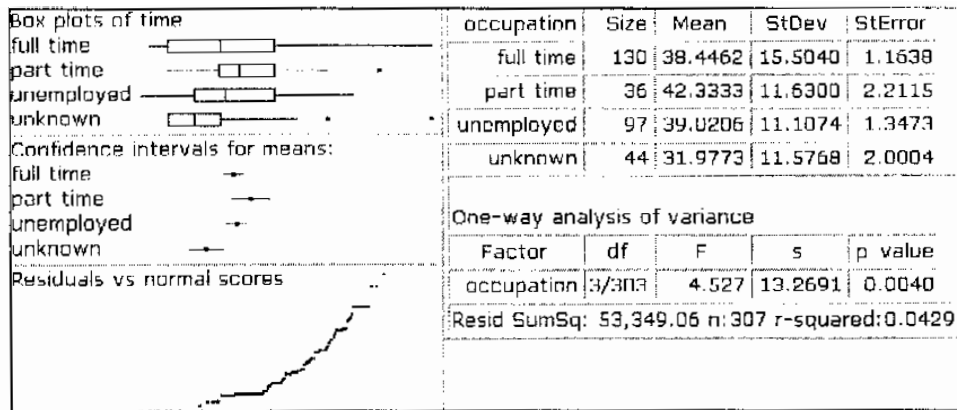


Figure 4.9: Association between completion time and occupational status

Figure 4.10 shows box plots and 95% confidence intervals for means illustrating the association between completion time and English search skill. We see that the graduates who answered “good” or “not confident” in English search skill take less time to complete their degrees than the graduates who answered “very good”.

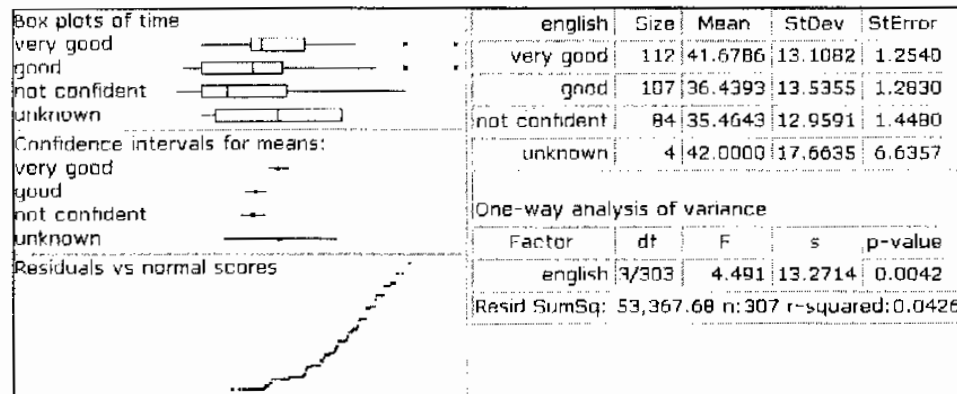


Figure 4.10: Association between completion time and English search skill

Figure 4.11 shows box plots and 95% confidence intervals for means illustrating the association between completion time and problems (family, etc.). Not surprisingly, we see that the graduates who have fewer problems take less time to complete their degrees than those with a lot of problems.

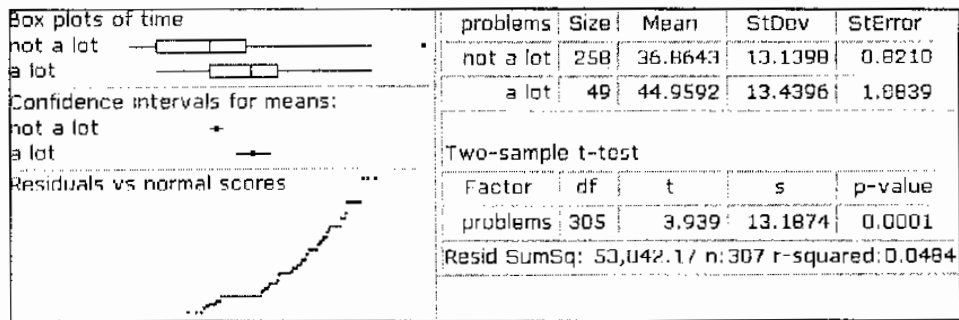


Figure 4.11: Association between completion time and problems (family, etc.)

Figure 4.12 shows box plots and 95% confidence intervals for means illustrating the association between completion time and thesis timing (if doing thesis). We see that the graduates doing their thesis continuously take less time to complete their degrees than those who stopped doing the thesis for a while or were not doing the thesis continuously.

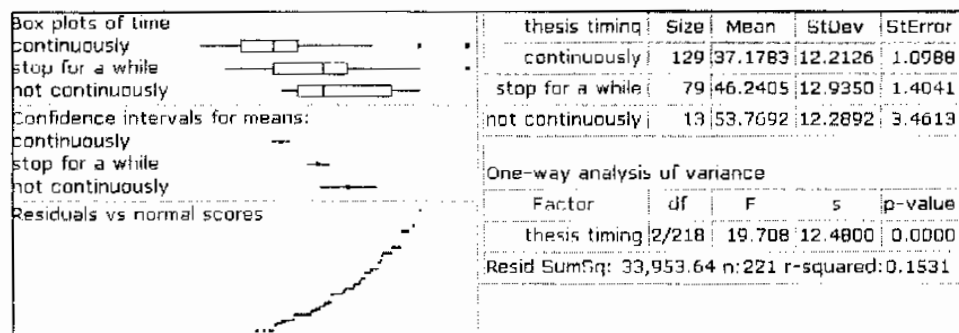


Figure 4.12: Association between completion time and thesis timing

4.3 Multiple Regression Analysis

Table 4.5 indicates that major group, program, occupational status, English search skill, problems, and thesis timing are associated with time to completion of degree. Next we develop a predictive model for time to completion of degree, using multiple regression analysis.

Figure 4.13 shows the full model of multiple regression analysis with all the predictor variables for the *time to completion of degree* factor. There are two statistically significant variables, included gives a goodness-of-fit, measured by the r-squared statistic, of 50.7% and the residual standard deviation is 9.8359. The model indicates that the variables major group and thesis timing are statistically significant.

| Linear Regression Analysis: Outcome = time | | | | |
|---|-------------|---------------|-------------------|---------|
| Determinant | Coefficient | StError | 95% CI | p-value |
| Constant | 43.4655 | 3.4168 | 36.7686, 50.1623 | 0.0000 |
| major | baseline: | agricIndustry | | 0.0000 |
| bioScience | 1.5741 | 4.3302 | -6.9131, 10.0612 | 0.7165 |
| chemistry | -1.9393 | 3.7153 | -9.2214, 5.3427 | 0.6021 |
| education | -8.6509 | 3.0366 | -14.6026, -2.6992 | 0.0047 |
| engineering | -6.3500 | 3.9041 | -14.0020, 1.3020 | 0.1050 |
| environment | -3.0695 | 3.6632 | -10.2493, 4.1103 | 0.4028 |
| humanities | 14.5634 | 3.7510 | 7.2114, 21.9153 | 0.0001 |
| MBA | -9.5123 | 3.5102 | -16.3922, -2.6323 | 0.0071 |
| MPA | -11.4799 | 3.0688 | -17.4948, -5.4651 | 0.0002 |
| naturalResources | 1.7903 | 3.7312 | -5.5148, 9.1114 | 0.6302 |
| nursing | -11.1441 | 3.8441 | -18.6785, -3.6097 | 0.0040 |
| other | 0.7908 | 3.6745 | -6.4113, 7.9929 | 0.8298 |
| program | baseline: | fullTime | | 0.3310 |
| partTime | -2.3219 | 2.3846 | -6.9958, 2.3519 | 0.3310 |
| occupation | baseline: | full time | | 0.1446 |
| part time | -1.8773 | 1.9622 | -5.7232, 1.9686 | 0.3395 |
| unemployed | -3.7820 | 1.6272 | -6.9714, -0.5926 | 0.0208 |
| unknown | -0.4118 | 1.9719 | -4.2768, 3.4532 | 0.8347 |
| english | baseline: | very good | | 0.6044 |
| good | -1.5377 | 1.1689 | -4.4166, 1.3413 | 0.2961 |
| not confident | -2.1578 | 1.6658 | -5.4228, 1.1073 | 0.1963 |
| unknown | -1.2303 | 5.2195 | -11.4605, 9.0000 | 0.8138 |
| problems | baseline: | not a lot | | 0.7041 |
| a lot | 0.6354 | 1.6716 | -2.6410, 3.9118 | 0.7041 |
| thesis timing | baseline: | continuously | | 0.0000 |
| stop for a while | 7.7095 | 1.5893 | 4.5944, 10.8246 | 0.0000 |
| not continuously | 16.1439 | 3.0007 | 10.2624, 22.0253 | 0.0000 |
| not doing thesis | -0.8245 | 2.1463 | -5.0313, 3.3823 | 0.7012 |
| r-sq: 0.5071 df: 284 RSS: 27,475.5038 s: 9.8359 | | | | |

Figure 4.13: Full model of multiple regression analysis

After using a backward procedure to eliminate redundant predictors, the model indicates that two variables are in this model, and the r-squared is 49.25%, which changes only slightly. The standard deviation also changes slightly. The result of fitting the model is shown in Figure 4.14.

The plot of predicted values against residuals in the bottom left of Figure 4.14, shows that the relationship between the outcome and determinants is linear, and that the homogeneity assumption is reasonable. The normal scores plot in the bottom right of this Figure, suggests that the normality assumption is reasonable for these data, with the exception of just one outlier, corresponding to a humanities major who finally graduated with a masters degree after seven years.

| Linear Regression Analysis: Outcome = time | | | | |
|---|-------------|---------------|-------------------|---------|
| Determinant | Coefficient | StError | 95% CI | p-value |
| Constant | 39.8302 | 2.9858 | 33.9780, 45.6823 | 0.0000 |
| major | baseline: | agricIndustry | | 0.0000 |
| bioScience | 1.8130 | 4.0904 | -6.2041, 9.8301 | 0.6579 |
| chemistry | -1.3136 | 3.4059 | -7.9892, 5.3619 | 0.7000 |
| education | -8.5967 | 3.0115 | -14.4993, -2.6941 | 0.0046 |
| engineering | -5.1435 | 3.6642 | -12.3254, 2.0383 | 0.1615 |
| environment | -3.2331 | 3.4088 | -9.9143, 3.4481 | 0.3437 |
| humanities | 15.3020 | 3.5785 | 8.2888, 22.3165 | 0.0000 |
| MBA | -8.9539 | 3.4367 | -15.6898, -2.2179 | 0.0096 |
| MPA | -11.6411 | 3.0073 | -17.5354, -5.7468 | 0.0001 |
| naturalResources | 2.9057 | 3.5248 | -4.0030, 9.8144 | 0.4104 |
| nursing | -11.5823 | 3.5729 | -18.5852, -4.5795 | 0.0013 |
| other | 1.1500 | 3.4384 | -5.5892, 7.8892 | 0.7383 |
| thesis timing | baseline: | continuously | | 0.0000 |
| stop for a while | 8.2586 | 1.5139 | 5.2913, 11.2259 | 0.0000 |
| not continuously | 16.8913 | 2.8925 | 11.2220, 22.5605 | 0.0000 |
| not doing thesis | -1.2046 | 1.8339 | -4.7990, 2.3898 | 0.5118 |
| r-sq: 0.4925 df: 292 RSS: 28,286.8176 s: 9.8424 | | | | |

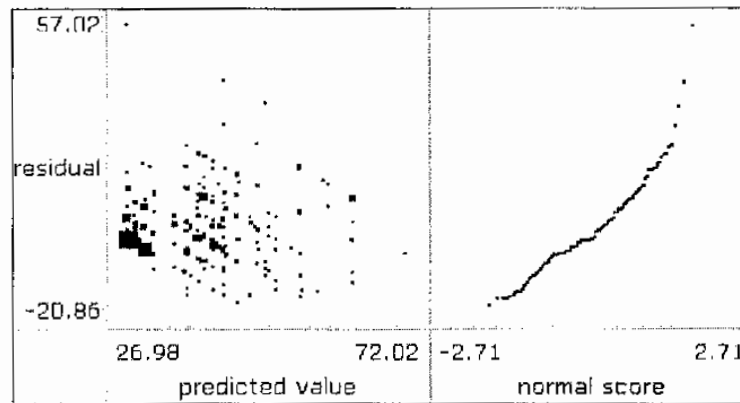


Figure 4.14: Multiple regression analysis of graduates' time to completion of degree

The result of fitting a multiple linear regression model, containing all six determinants to the factor “time to completion of degree”, shows that there are two variables that are significant in this model. The predicted takes the form:

$$\begin{aligned}
 \text{Time to completion of degree} = & 39.830 + 0 \text{ agricIndustry} + 1.813 \text{ bioScience} \\
 & - 1.314 \text{ chemistry} - 8.597 \text{ education} \\
 & - 5.144 \text{ engineering} - 3.233 \text{ environment} \\
 & + 15.303 \text{ humanities} - 8.954 \text{ MBA} \\
 & - 11.641 \text{ MPA} + 2.906 \text{ naturalResources} \\
 & - 11.582 \text{ nursing} + 1.150 \text{ other} \\
 & + 0 \text{ continuously} \\
 & + 8.259 \text{ stop for a while} \\
 & + 16.891 \text{ not continuously} \\
 & - 1.205 \text{ not requiring a thesis}
 \end{aligned}$$

For example, consider a student graduating with an MPA without doing a thesis. The time to completion is predicted as follows.

$$\begin{aligned} \text{Time to completion of degree} &= 39.830 - 11.641 \text{ MPA} - 1.205 \text{ not requiring a thesis} \\ &= 26.984 \text{ months.} \end{aligned}$$

$$\begin{aligned} \text{Time to completion of degree} &= 39.830 - 3.233 \text{ environment} + 0 \text{ continuously} \\ &= 36.597 \text{ months.} \end{aligned}$$

The interpretation is, these graduates take 39.83 months (baseline duration), less 11.64 months for doing the MPA major, less 1.20 months for not requiring a thesis program, their expected time to complete is 26.98 months, and less 3.233 months from baseline duration for doing the environment major and requiring a thesis program by doing a thesis continuously, their expected time to complete is 36.60 months. It should be noted, of course, that the residual standard deviation is 9.84 months, which gives a measure of the variation in completion times around this forecast.