Chapter 3

Preliminary Data Analysis

In this chapter, we present the general characteristics of the graduate students selected for our study, and we investigate the associations between the determinants and the outcome (academic achievement of graduates). The topics in this preliminary analysis are presented as follows.

(a) General characteristics of graduate students.

(b) The association between academic achievement and determinant.

The variables and their data coding are as follows:

Gender	1 = male, 2 = female
Age group	1 = 20-25, 2 = 26-30, 3 = 31-40, 4 = 40+
Marital status	1 = single, 2 = married
Domicile	1 = near local (Pattani, Yala, Narathiwat, Songkha, Satun) 2 = local (the province in the South except near local) 3 = others
Occupation	0 = no work, 1 = government officer, 2 = individual
Work experience	0 = no, 1 = 1-5 year, 2 = 6-10 year, 3 = 11-20 year, 4 = 20+
Faculty	1 = Management Sciences (Mng) 2 = Nursing (Nurs) 3 = Engineering (Eng) 4 = Science (Sci) 5 = Environmental Management (Env) 6 = Natural Resources (Nat) 7 = Agro-Industrial (Agro) 9 = Education (Ed) 10 = Humanities and Social Sciences (Hum) 11 = Science and Technology (SciT)
Study plan	1 = plan A, requiring a thesis, 2 = plan B, not requiring a thesis

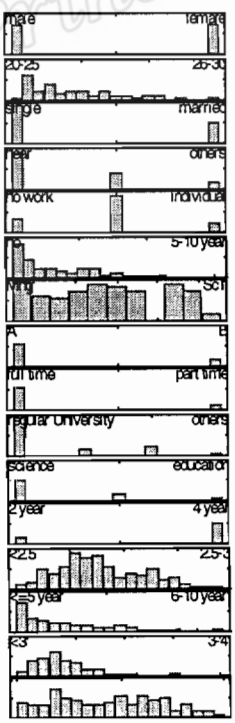
Prince of Songkla University Pattani Campus

Type of study	1 = full time, 2 = part time
BA University	1 = regular university, 2 = open university, 3 = college, 4 = others
BA program	2 = 2 year, 4 = 4 year
BA GPA	1 = 2-2.49, 2 = 2.5-2.99, 3 = 3+
Duration BA-MA	1 = 1-5 year, 2 = 6-10 year, 3 = 11-15 year, 4 = 15+
Total years of study	1 = 1-3 year, 2 = 4 year, 3 = 5-6 year, 4 = 6+

General characteristics of graduate students

Histograms are used for describing the distributions of the raw data, as shown in Figure 3.1. This figure also contains extended numerical summaries of each variable.

Figure 3.1: Histograms and numerical summaries of variables



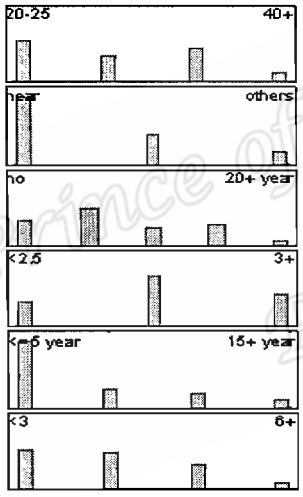
col	variable	size	mean	st dev	SE	skew	kurt	min	max
1	gender	294	1.503	0.501	0.029	-0.011	0.999	1	2
2	age	294	29.201	6.645	0.388	0.934	3.2	20	50
3	marital status	294	1.34	0.475	0.028	0.674	1.451	1	2
4	domicile	294	1.5	0.695	0.041	1.039	2.765	1	3
5	occupation	294	0.912	0.612	0.036	0.047	2.636	0	2
6	experience	294	6.048	6.224	0.363	1.125	3.842	0	31
7	faculty group	294	5.425	3.013	0.176	0.129	1.886	1	11
8	Study plan	294	1.218	0.413	0.024	1.37	2.878	1	2
9	Study Type	294	1.194	0.396	0.023	1.548	3.397	1	2
10	B.A University	294	1.554	0.872	0.051	1.273	3.27	1	4
11	B.A major	294	1.374	0.631	0.037	1.463	3.918	1	3
12	B.A program	294	3.456	0.892	0.052	-1.024	2.046	2	4
13	B.A GPA	294	2.794	0.398	0.023	0.452	2.635	2	3.93
14	durationB.A-M.A	294	5.575	5.203	0.303	1.075	3.373	0	23
15	total years	294	3.6	1.403	0.082	1.778	7.076	1.52	10.14
16	M.A GPA	294	3.437	0.251	0.015	0.105	2.015	3	4

294 graduate students of PSU during the academic years 1993-1997

Prince of Songkla University Pattani Campus

Figure 3.1 shows the sample size and moments of the distributions for each variable (mean, standard deviation, standard error, skewness and kurtosis coefficient), and their minimum and maximum values. The moments are not particularly meaningful for the nominal variables with three or more categories, but are included for completeness. The number of cases is 294. The outcome variable is academic achievement, which its measured by the grade point average (GPA) of the graduate students. The distributions of the categorical variables (age, experience, bachelor's degree GPA, duration of period from finishing bachelor's degree until enrolling in the Master's degree, and total number of years of study) are shown in Figure 3.2.

Figure 3.2: Histograms and numerical summaries of categorical variables



col	variable	size	min	max
1	age group	294	1	4
2	domicile	294	1	3
3	experience	294	0	4
4	B.A GPA	294	1	3
5	duration B.A-M.A	294	1	4
6	total years	294	1	4

294 graduate students of PSU during the academic years 1993-1997

Prince of Songkla University Pattani Campus

Tables 3.1 show the detailed distributions of each determinant. The percentages of males and females were the same. Age is distributed into four groups with the majority (38.1%) between 20 and 25 year of age, while the mean age was 29 years, and its minimum and maximum were 20 and 50 years, respectively. Most of the graduate students (70%) were single. Most (62%) lived near locall (in Pattani, Yala, Narathiwat, Songkla, and Satun provinces). The majority (62%) had jobs as government officers, 15% worked in individual industry, while 23% were unemployed. Twenty-one percent had between 10 and 20 years experience, 35% had between 1 and 5 years experience, and 23% had no experience. The proportions

taking study plans A (requiring a thesis) and B (not requiring a thesis) were 78% and 22%, respectively, and 81% were full time students. Most of the graduate students (67%) came from regular universities, 16% from colleges and 14% from the Open University.

Table 3.1: Distributions of mean achievement

Determinant	Category	Count	Percentage	Mean Achievement
Gender	Male	146	49.66	3.42
	Female	148	50.34	3.46
Age group	20-25	112	38.10	3.42
	26-30	72	24.49	3.45
	31-40	89	30.27	3.46
	40+	21	7.14	3.39
Marital status	Single	194	65.99	3.45
	Married	96	34.01	3.41
Domicile	Near local	181	61.56	3.41
	Local	79	26.87	3.49
	Others	34	11.57	3.46
Occupation	No Work	69	23.47	3.39
	Government	182	61.90	3.45
	Individual	43	14.63	3.45
Work experience	0 year	69	23.47	3.39
	1-5 year	104	35.37	3.45
	6-10 year	49	16.67	3.45
	10-20 year	61	20.75	3.45
	20+ year	11	3.74	3.46
Study Plan	A	230	78.23	3.44
	B	64	21.77	3.42
Type of Study	Full Time	237	80.61	3.44
	Part Time	57	19.39	3.44

Prince of Songkla University Pattani Campus

Table 3.1: Distribution of mean achievement (ctd.)

Determinant	Category	Count	Percentage	Mean Achievement
Faculty	Agro	31	10.54	3.40
	Ed	36	12.24	3.55
	Eng	22	7.48	3.41
	Env	38	12.93	3.35
	Hum	30	10.20	3.49
	Mng	39	13.27	3.38
	Nat	35	11.90	3.54
	Nurs	26	8.84	3.52
	Sci	30	10.20	3.31
	Sci&Tech	7	2.38	3.40
BA University	Regular University	197	67.01	3.45
	Open University	40	13.61	3.43
	College	48	16.33	3.39
	Others	9	3.06	3.37
BA Major	Science	208	70.75	3.43
	Human	62	21.09	3.43
	Education	24	8.16	3.54
BA Program	2 year programs	80	27.21	3.41
	4 year programs	214	72.79	3.45
BA GPA	<2.5	68	23.13	3.39
	2.5-3	137	46.60	3.40
	3+	89	30.27	3.52
During BA-MA	<6 years	180	61.22	3.42
	6-10 years	50	17.01	3.47
	11-15 years	41	13.95	3.43
	15+ years	23	7.82	3.50
Total years of study	<3 years	107	36.39	3.50
	3-4 years	104	35.37	3.42
	5-6 years	64	21.77	3.42
	6+ years	19	6.46	3.27

Prince of Songkla University Pattani Campus

Almost 71% finished their basic bachelor's degree education in science. The majority (73%) of graduate students completed a four-year bachelor program while 27% finished a two-year bachelor program. The BA GPA was distributed into three groups with the majority (47%) between 2.5 and 3 and 30% greater than 3. The mean GPA was 2.79. Its minimum and maximum values were 2 and 3.93, respectively. Almost 61% waited less than 6 years after completing their bachelor's degree before enrolling as a graduate degree student. Most of graduate students (72%) took 4 years or less to complete their graduate degree.

The association between academic achievement and determinant

As described in Chapter 2, the p-value for testing the null hypothesis of no association between a categorical determinant and a continuously distributed outcome may be obtained from the two-sample *t* test for a dichotomous determinant and one-way analysis of variance for a multi-categorical determinant. The corresponding p-values are given in Table 3.2.

Prince of Songkla University Pattani Campus

Table 3.2: The statistical significance of associations

Determinant	Statistical Values	p-value
Gender	t-statistic : 1.316	0.189
Age-group	F-statistic : 0.774	0.509
Status	t-statistic : 1.056	0.292
Domicile	F-statistic : 2.866	0.059
Occupation	F-statistic : 1.699	0.185
Work experience	F-statistic : 0.853	0.492
Faculty	F-statistic : 3.945	0.000
Study Plan	t-statistic : 0.672	0.502
Type of study	t-statistic : 0.727	0.469
BA University	F-statistic : 1.002	0.392
BA major	F-statistic : 2.208	0.112
BA program	t-statistic : 0.950	0.251
BA GPA	F-statistic : 8.472	0.000
Duration BA- MA	F-statistic : 1.150	0.329
Total years of study	F-statistic : 5.586	0.001

Table 3.2 indicates that faculty, BA GPA, and total number of years of study, are statistically significant. We conclude that the achievement GPAs are different for each of these determinants. As might be expected, the BA GPA is very highly significant (p = 0, to four decimal places).

The p-values are useful, but confidence intervals are more informative for showing the associations. Figure 3.3 shows box plots and 95% confidence intervals of academic achievement by gender. From this graph it appears that the women's mean academic achievement was higher than the men's. However this difference is not statistically significant, as can be seen from the overlapping confidence intervals for the population means. (We saw in Table 3.2 that the corresponding p-value is 0.189, which exceeds 0.05.)

Prince of Songkla University Pattani Campus

Figure 3.3: Box plots of academic achievement by gender

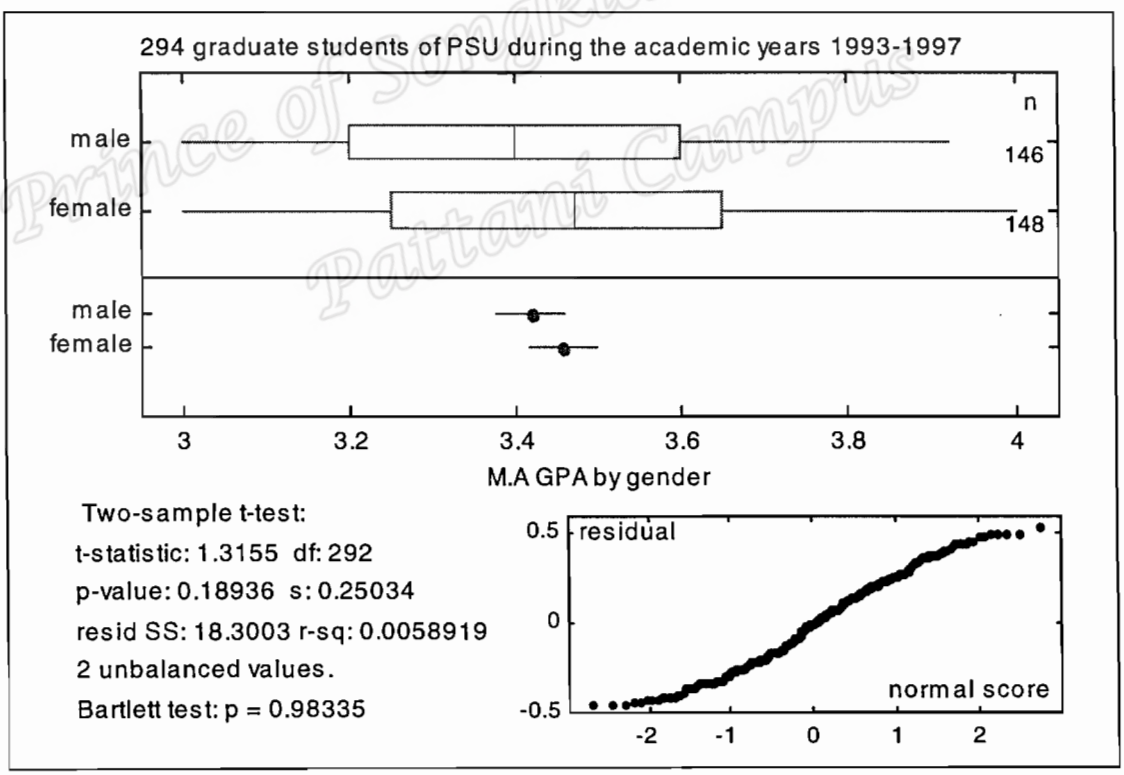


Figure 3.4 shows box plots and 95% confidence intervals of academic achievement by age groups. The distributions of academic achievement for the four age groups are quite similar with shorter tails than the normal distribution, as can be seen from the curvature in the normal score plot. From the 95% confidence intervals, the mean academic achievement increases with age group, except for those aged 40 years or more, for whom the mean academic achievement is markedly lower.

Figure 3.4: Box plots of academic achievement by age group

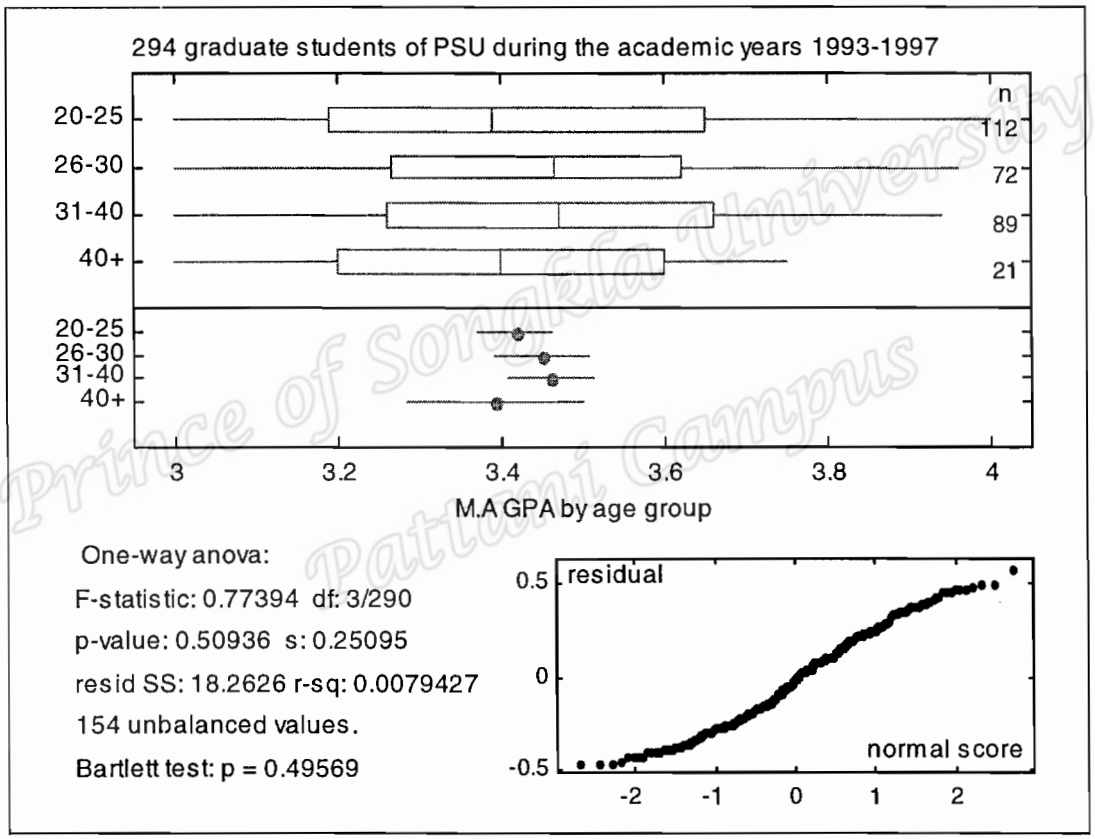


Figure 3.5 shows box plots and 95% confidence intervals of academic achievement by total number of years of study. There is an association between mean academic achievement and total years of study (p-value = 0.0009). Students with shorter study periods tended to have higher means academic achievement than those who did not. However, the groups with 3-4 years and 4-6 years were not distinguishable significantly different from each other.

Figure 3.5: Box plots of academic achievement by total year of study

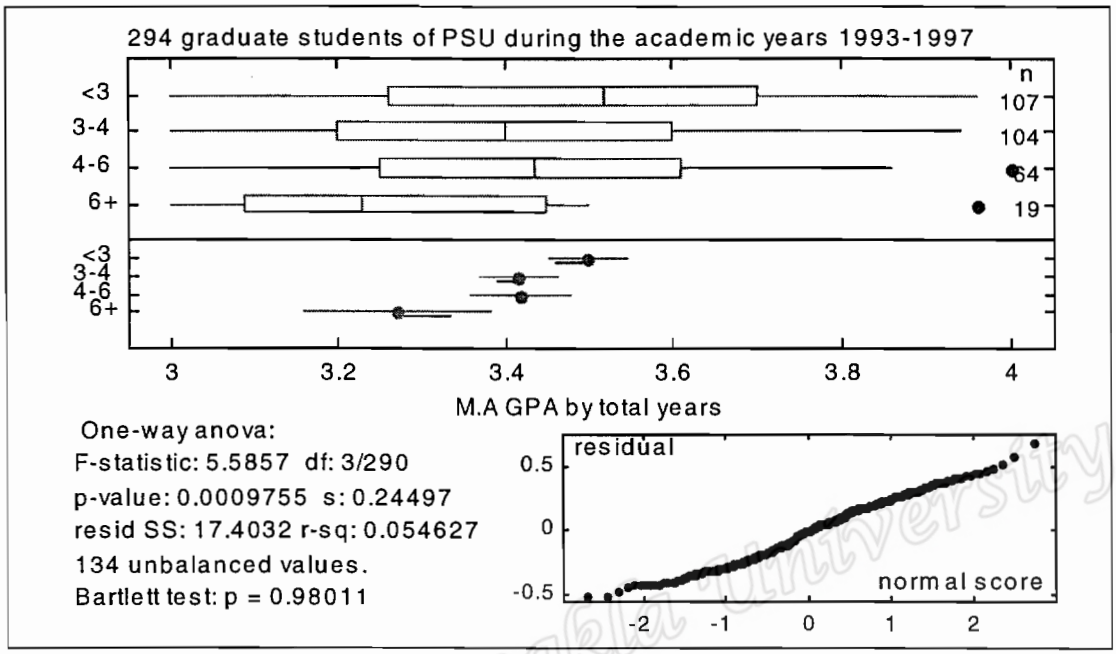


Figure 3.6 shows box plots and 95% confidence intervals of academic achievement by BA GPA. Using one-way analysis of variance, the study shows an association between BA GPA and mean academic achievement, with p-value 0.0003. The mean academic achievement clearly increases with BA GPA.

Figure 3.6: Box plots of academic achievement by BA GPA

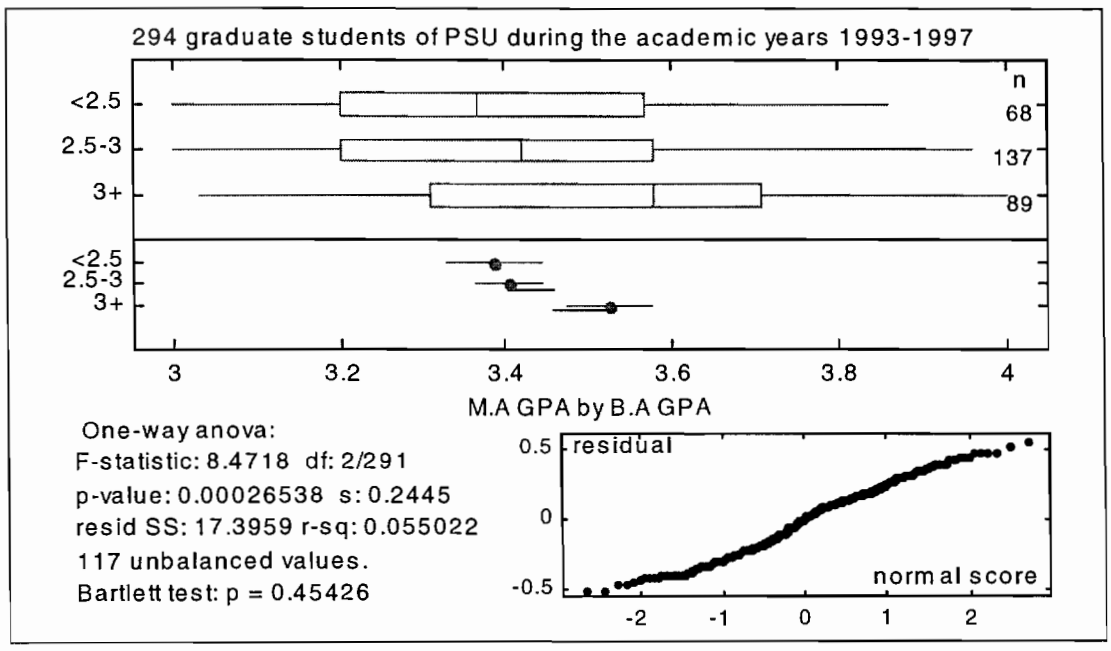
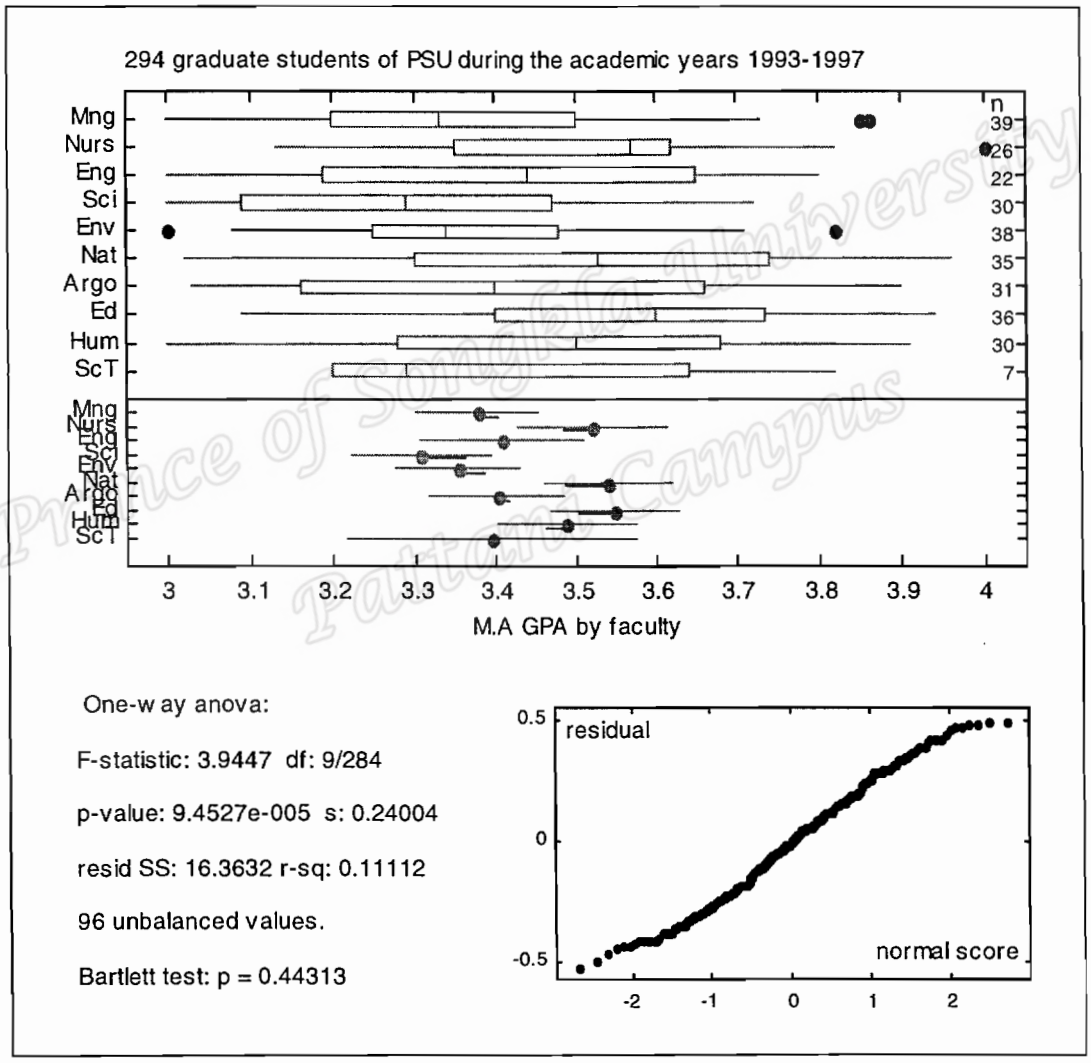


Figure 3.7 shows box plots and 95% confidence intervals of mean academic achievement by faculty. There is a statistically significant association between faculty and mean academic achievement, with p-value 0. The mean academic achievement of the faculties Natural Resources, Nursing, and Education are higher than the other faculties, while the lowest are faculties of Environmental Management and Science.

Figure 3.7: Box plots of academic achievement by faculty



The faculties may thus be grouped as follows:

Environment Management Science	<	Agro-Industrial Engineering Management Science Science &Technology	<	Nursing Education Humanities Natural Resources

Figure 3.8 shows box plots and 95% confidence intervals of academic achievement by BA university. There is no association between mean academic achievement and BA university (p-value > 0.05). However, students who graduated from regular university, open university, college, and the other universities tended to have decreases mean academic achievement respectively.

Figure 3.8: Box plots of academic achievement by BA university

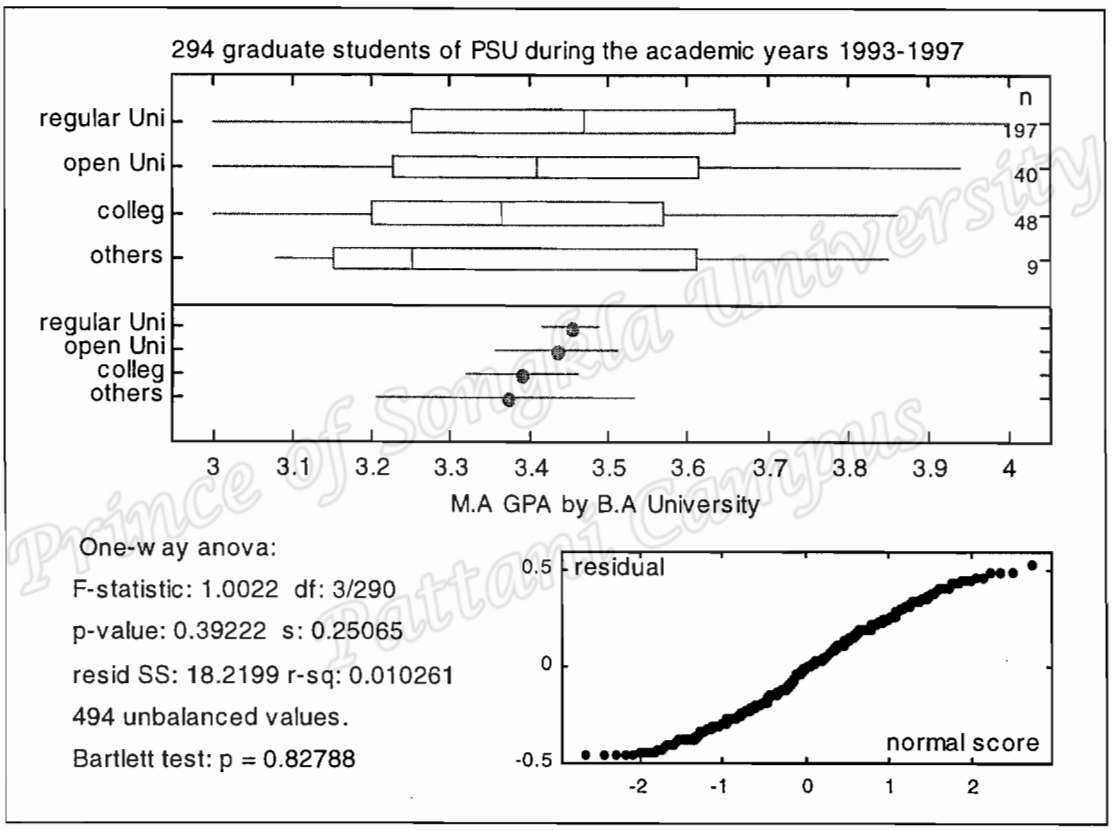


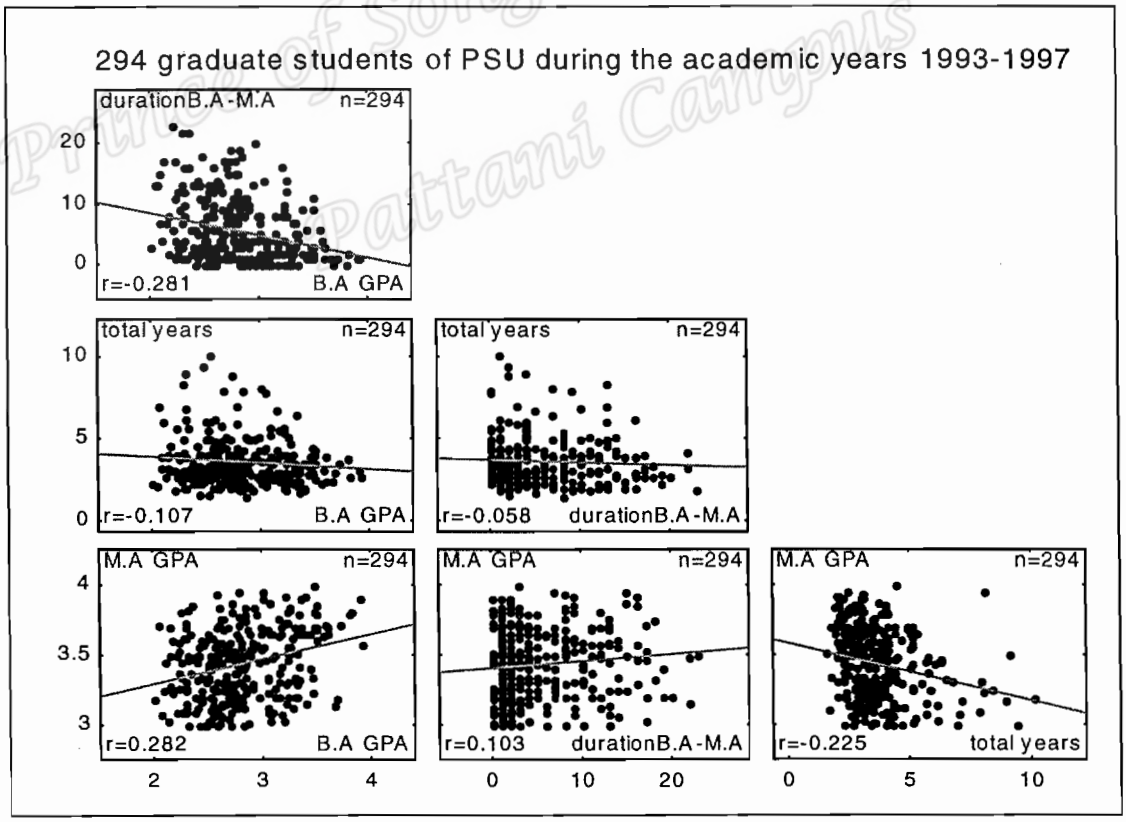
Table 3.3 shows the correlation coefficients between each of the continuous determinants (age, work experience, BA GPA, duration from BA to MA, total years of study) and the outcome, note that the coefficient correlation obtained from Pearson's product moment correlation, with the corresponding p-values above the diagonal. These indicate that BA GPA and years of study are significant correlated with MA GPA. BA GPA had the highest positive correlation, that is 0.283, while total years of study had a negative correlation (r = –0.226). Age and academic achievement had the least correlation, and these are not statistically significant.

Table 3.3: The p-values and coefficients correlation between continuous determinants and academic achievement

Determinant	Coefficient correlation	p-value
Age	0.038	0.519
Work experience	0.059	0.312
B.A GPA	0.283	0.000
Duration B.A-M.A	0.103	0.077
Total years of study	-0.226	0.000

The relations between BA GPA, duration from BA to MA, total years of study, and MA GPA are shown in Figure 3.9.

Figure 3.9: Scatter plots of four variables



Prince of Songkla University Pattani Campus