

# **Relationship and Forecasting equation between academic outcome and admission test scores of King Mongkut's University of Technology North Bangkok**

Jumrean Srikamta

*The Office of the Faculty of Industrial Technology and management  
Faculty of Industrial Technology and Management  
King Mongkut's University of Technology North Bangkok, Thailand*

*\*Corresponding author: Jumrean.s@fitm.kmutnb.ac.th*

## **Abstract**

This research had objectives to study the relationship and create forecasting equation between 4 academic outcome and admission test scores of students of King Mongkut's University of Technology North Bangkok. Conducting the study from representative samples of the students who had entered and registered in academic year 2010-2012 amounted to 2,650 samples by using a systematic random sampling. Data were collected from Academic Services division, King Mongkut's University of Technology North Bangkok. Statistical data analysis used Simple Regression Analysis method by determining a Pearson Correlation Coefficient as well as Stepwise Multiple Regression Analysis. The research results found that the academic outcomes (GPA) had a low level positive relationship with entrance examination scores from admission system ( $r = .444$ ) statistically significance at .05 level. For an analysis of predictive power, it+ was found that the GPAX, GAT, O-NET and PAT scores were variables which could provide the academic outcomes forecast with statistically significance at .05 level. The prediction of all 4 variables was 23.5 percent with Standard Error of

Estimate (S.E.est) of .42836 that could be written the forecasting equation in raw scores and standard scores as following:

$$\hat{Y}_{KMUTNB} = .353 + .342 \text{ GPAX} + .002 \text{ GAT} + .002 \text{ ONET} - .001$$
$$\hat{Z}_{KMUTNB} = .227 \text{ GPAX} + .186 \text{ GAT} + .204 \text{ ONET} - .071 \text{ PAT}$$

**Keywords:** Relationship; forecasting equation; admission test scores

## **Introduction**

### **Background and significance of the study**

An education in bachelor's degree is defined as higher education that provides education by higher educational institute or university. Each university has various systems for entering student both an admission system and entrance examination at individual faculty level of the university and central admission at national level. The university entering system by centralize national organization previous to academic year 2006 is called "Entrance" and then it has been altered to the central university admissions system or is called "Admission". The Admission as a system of applicant selection to enter university was trialed in academic year 2005 with simultaneous Entrance system, and thence Admission system took the place of Entrance system completely in academic year 2006.

In academic year 2005, King Mongkut's University of Technology North Bangkok participated on trial for the program of Central University Admissions System: CUAS by means the entry score of accepted applicant wasn't calculated from the examination score only but also partly from high school grade point average. Following academic year 2006, it had reform of selection by annulling Entrance system; which the scores were only obtained from entrance examination; to Admission system; which used the partial score from academic outcome and result of Basic Education test according with the score of National Educational test. Thence, the final score was used to make an application via internet system.

### **Purpose of the Study**

1) To study the relationship between the academic outcome and admission test score of students of King Mongkut's University of Technology North Bangkok.

2) To create forecasting equation of academic outcome from admission test scores regarding the students of King Mongkut's University of Technology North Bangkok.

## **Literature Review**

### **Present student enrolment systems KMUTNB**

Present student enrolment systems of King Mongkut's University of Technology North Bangkok for undergraduate level student were both conducted by the university and through central admission system. Student enrolment carried out by university consists in quota programs of faculty and collage which area quota, good-grade student quota, quota for good-grade student specific to scientific and technology ability, good-grade and manner student quota, Rayong area quota, eastern region quota, quota for a person excellent in sport, or arts and culture, or innovation and invention. Programs about direct entrance were GAT/PAT scores submission, direct entrance examination, special associate program and program on good moral student appreciation for student enrolment into Prachinburi campus in cooperation between university and the Educational Service Area office (OBEC)

### **Criteria category of central university admissions system**

University Admissions System (Admission) has been performed in two phases according with criteria specification. First phase was during academic year 2005 – 2009 as well as second phase in academic year 2010 – present. Council of University Presidents of Thailand has categorized criteria category of Central University Admissions System (Admission) 9 main categories as category 1 Health science, category 2 Physical science, category 3 Engineering, category 4 Architecture, category 5 Agriculture, category 6 Administration, Commerce, Accountancy, Tourism and Hotel, and Economics (category 6.1 Administration, Commerce, Accountancy and Economics, category

6.2 Tourism and Hotel), category 7 Education category 8 Arts/Music and Dramatic arts as well as category 9 Humanities and Social Science.

The score criteria as of academic year 2010 comprise:

1) High School Grade Point Average (GPAX) gives weight value 20%

2) Test result of National Institute of Educational Testing (O-Net) gives weight value 30%

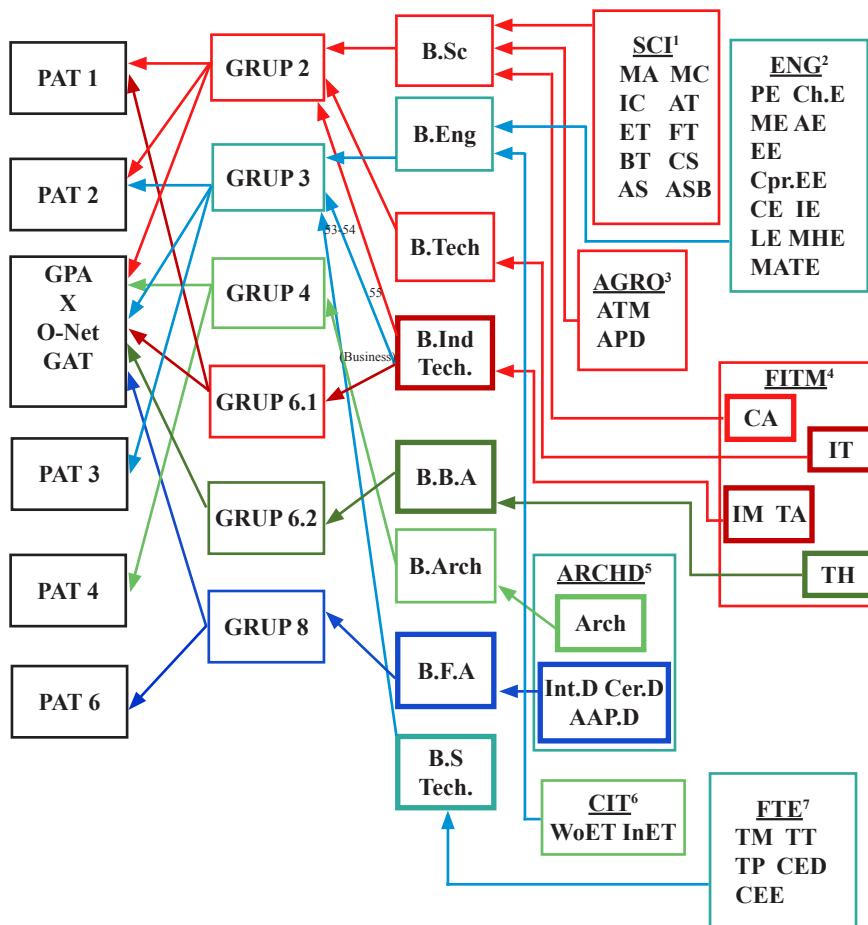
3) Test result of General Aptitude Test (GAT) gives weight value 10-50%

4) Test result of Professional Aptitude Test (PAT) gives weight value 0 - 40%.

Incidentally, the Professional Aptitude Test (PAT) is to examine basic knowledge to go into a particular profession as well as evaluate potential for studying in certain professions successfully. It has 7 categories which are PAT 1 Mathematics, PAT 2 Science, PAT 3 Engineering, PAT 4 Architecture, PAT 5 Educational Profession, PAT 6 Fine and Applied Arts and PAT 7 Languages

5) Results of an interview and physical examination, the interview is conducted by university/institute, moreover performs the physical examination in order to get supplementary information for considering readiness and appropriateness. This is the last process prior to submission without calculating the score weight value.

Regarding King Mongkut's University of Technology North Bangkok, conclusion of criteria for Central University Admissions System (Admission) by each faculty, indicating with Picture 1: Criteria for Admission System, KMUTNB, as follow;

**Figure 1** Criteria for admission system, KMUTNB

SCI<sup>1</sup> = Faculty of Applied Science

ENG<sup>2</sup> = Faculty of Engineering

AGRO<sup>3</sup> = Faculty of Agro-industry

FITM<sup>4</sup> = Faculty of Industrial Technology and Management

ARCHD<sup>5</sup> = Faculty of Applied Arts

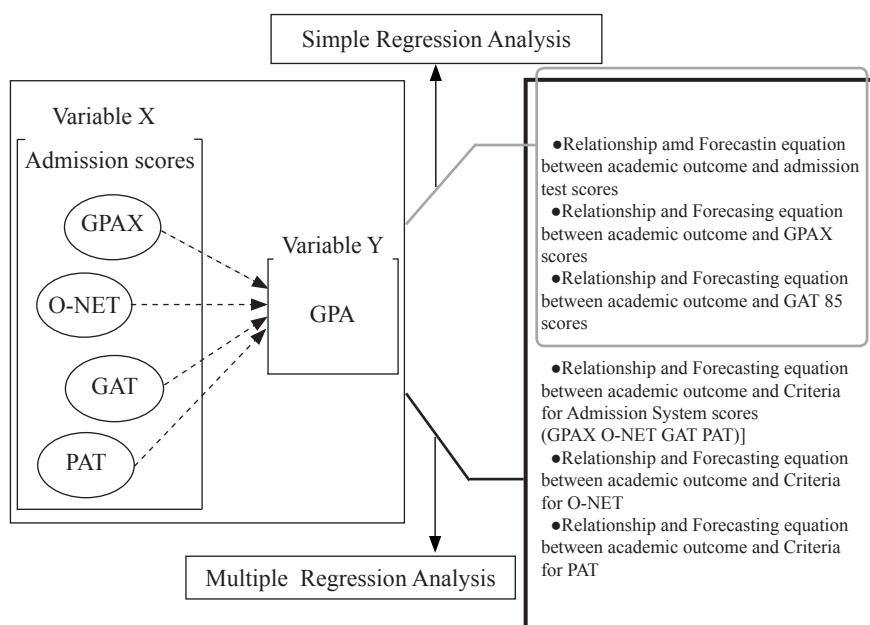
CIT<sup>6</sup> = College of Industrial Technology

FTE<sup>7</sup> = Faculty of Technology Education

## Methodology

In this study, predictor variables or independent variables (X) were admission test scores according with the criteria specification of phase 2 (as of academic year 2010), furthermore, criterion variables or dependent variables (Y) were Grade Point Average (GPA) of student enrolled via Admission system in academic year 2010 – 2012. In regard for conclusion of conceptual framework, it determined the correlation coefficient with Pearson Product Moment Correlation (r) and Multiple Regression Analysis, Stepwise Regression technique indicating picture 2 Conceptual Framework as following:

**Figure 2** Conceptual Framework



The samples to study were students who entered through Admission system during academic year 2010 – 2012 of 2,650 students. The gathering data on Grade Point Average and admission test scores was analyzed and interpreted to write the forecasting equation in raw scores basis and forecasting equation in standard scores basis. Regarding criteria of

correlation coefficient (r) for interpretation (Hinkle D. E. 1998, p.118) were very strong relationship ( $r = .90 - 1.00$ ), strong relationship ( $r = .70 - .90$ ), moderate relationship ( $r = .50 - .70$ ), low relationship ( $r = .30 - .50$ ) and very low relationship ( $r = .00 - .30$ ). Details of samples amount could be shown as following table1

**Table 1** Details of samples

Faculty	Admission Criteria						Total
	2	3	4	6.1	6.2	8	
ENG		799					799
SCI	1,231						1,231
FITM	177	22		38	72		309
AGRO	42						42
CIT		47					47
ARCHD			11			105*	116
FTE		106					106
<b>KMUTNB</b>	<b>1,450</b>	<b>974</b>	<b>11</b>	<b>38</b>	<b>72</b>	<b>105</b>	<b>2,650</b>

**Remark:** \* number 105 equaled to  $78 + 27$ , 27 referred to admission amount year 2010 conducted by CIT

## Results

Correlation between the academic outcomes and admissions test scores of students of King Mongkut's University of Technology North Bangkok related to following table 2

**Table 2** Correlation coefficient

Admission Criteria	r	Sig
GRUP 2	.532**	.0001
GRUP 3	.435**	.0001
GRUP 4	.325	.164
GRUP 6.1	.549**	.0001
GRUP 6.2	.124	.150
GRUP 8	.181*	.033
KMUTNB	.444**	.0001

\* Statistical significant level .05

\*\* Statistical significant level .01

Such table revealed that the economic outcomes (GPA) of students of King Mongkut's University of Technology North Bangkok had a positive low relationship with admission test scores ( $r = .444$ ) statistically significance at .01 level. Considering each of admission criteria category, it was found that students who got positive moderate relationship between academic outcomes (GPA) and admission test scores, were category 6.1 Administration, Commerce, Accountancy and Economics and category 2 Physical Science ( $r=.549$  and  $.532$ ) with statistically significance at .01 level.

Concerning students of criteria category 3 Engineering, academic outcomes (GPA) positive low correlated with admission test score ( $r = .435$ ) statistically significance at .01 level. Moreover students enrolled by criteria category 8 Arts/ Music and Dramatic arts had positive very low relationship between academic outcomes and admission score test ( $r = .181$ ) statistically significance at .05 level.

For students in criteria category 4 Architecture and category 6.2 Tourism and Hotel, type 1, the relationships between academic outcomes and admission test scores were insignificant. In other words, academic outcomes were not in relation to admission test scores.

In consideration of relationship between academic outcomes and assessing scores, it was found that the academic outcomes had low relationship with the scores of GPAX, O-Net and GAT ( $r= .338, .360$  and  $.360$ ) as well as had positive very low relationship with PAT scores ( $r=.189$ ) statistically significance at .01 level. Thus, an analyzed predictive power was revealed as following

**Table 3** Results of predictive power analysis

Predicted Variable	R	R2	Adjusted R2	b	S.E.est	$\beta$	t	Sig.
GPAX	.388	.151	.150	.342	.023	.277	14.652	.0001
GAT	.460	.211	.221	.002	.000	.186	8.993	.0001
O-NET	.481	.231	.230	.002	.000	.204	8.797	.0001

a = .353 S.E.est y= .42836

\* Statistical significant level .05

Table indicated that students of King Mongkut's University of Technology North Bangkok obtained scores of GPAX, GAT, O-NET and PAT that had ability to forecast academic outcomes (GPA) with statistically significance at .05 level. All 4 variables in combination were predictable on academic outcomes as 23.5 percent with Standard Error of Estimate (S.E.est) of .42836. It could be written the forecasting equation in raw scores and standard scores as following:

Forecasting equation represented raw scores

$$KMUTB = .353 + .342 \text{ GPAX} + .002 \text{ GAT} + .002 \text{ Onet} - .001 \text{ PAT}$$

Forecasting equation represented standard scores

$$KMUTNB = .227 \text{ GPAX} + .186 \text{ GAT} + .204 \text{ Onet} - .071 \text{ PAT}$$

## Conclusion and Discussion

The findings were in accord with the hypothesis that admission test scores had positive relationship with academic outcomes. Corresponding with the relationship on a faculty scale, there are Agro-Industry Faculty ( $r = .749$ ), Applied Science Faculty ( $r = .531$ ), Industrial Technology and Management Faculty ( $r = .495$ ), Engineering Faculty ( $r = .448$ ) and College of Industrial Technology ( $r = .369$ ) that admission test score positive related with the academic outcomes. In consideration of the assessing score details, it was revealed that GPAX (High School Grade Point Average) had positive relationship with academic outcomes. It was in the same as study results of Patama Arwae et al. (2010) discovered that the learning achievement of high school studying as university entrance examination score related with learning achievement of undergraduate studying with statistically significance at .01 level. Furthermore, there were similarity with Patchadaphan Udompet (2012) and Montharat Choopinit (1997) found that learning achievement of Matthayom 6 as university entrance examination score had the relationship with learning achievement.

Regarding results of predictive power analysis by all assessing scores variable were used as predictable variable for studying (GPAX GAT O-net and PAT), it was in accord with study results of Daow

Sanguanrungsirikul (2011) indicated that elements for prediction in learning achievement of students of King Mongkut's University of Technology Thonburi were the technical knowledge involving High School Grade Point Average (GPAX), scores of Ordinary National Education Test, General Aptitude Test (GAT) and Professional and Academic Aptitude Test (PAT).

### **Acknowledgement**

This research was supported by New Scholar Research Fund from King Mongkut's University of Technology North Bangkok, budget year 2012.

## References

Arwae, P., Premprat, M., & Phincharean, P. (2010) *Relationship among Seconday Education's Learning Achievement, Examination Score, University Education's Learning Achievement, and Academic Achievement Graduates at Prince of Songkla University, Pattani Campus (Academic year 2003-2007)*. research of Songkla University, Pattani Campus.

Udompet, P. (2012). The correlation among learning achievement grade 12, entrance exam scores and learning achievement of 1<sup>st</sup> to 3<sup>rd</sup> year medical students Faculty of Medicine Siriraj Hospital. *Siriraj Medical Bulletin*, 5(2), 49-56

Choopinit, M. (1997). *Factors Predicting Academic Achievement of Undergraduates Students at Rajabhat Institute Nakhonsithammarat*. Faculty of Education Prince of Songkla University.

Sanguanrungsirikul, D. (2011). A Prediction of Learning Achievement of King Mongkut's University of Technology Thonburi Students Admitted Throught Central University Admission System. *KMUTT Research And Development Journal*, 34(October – December), 431-441.

Hinkle, D. E, William, W., & Stephen G. J. (1998). Applied Statistics for the Behavior Sciences. 4<sup>th</sup> ed. New York: Houghton Mifflin.