British Journal of Education
Vol.4, No.4, pp.60-69, April 2016
Published by European Centre for Research Training and Development UK (www.eajournals.org)

DECISION MODEL FOR SUSPENSION OR WITHDRAWAL OF COLLEGE STUDENTS IN TAIWAN: VERIFICATION OF MODEL

Chun-Min Hung[1], Chun-Yen Chung[2], Yan-Kuin Su[3] and Chin-Chiuan Lin[4]*

[1]Director of Computer Centre and Department of Information Management, Kun Shan University, Taiwan
[2]Department of Information Engineering, Kun Shan University, Taiwan
[3]President, Kun Shan University, Taiwan
[4]Department of Business Administration, Kun Shan University, Taiwan

ABSTRACT: *The present study verified the decision model proposed by Hung et al. (2016) of college students applying for suspension/withdrawal from school in Taiwan based on empirical data. The present study employed path analysis and the chi square test to verify the decision model. The results indicated the decision model accurately reflects the actual situation in current Taiwan.*

KEYWORDS: Suspension, Withdrawal, Verify model, Path Analysis

INTRODUCTION

The suspension/withdrawal problem has become a major issue for all private colleges in Taiwan due to the low birth rate in recent years. Further, the number of colleges students will decrease from about 250K in 2016 to 142K in 2028 because the number of new births decreased from 271K in 1998 to 167K in 2010 (Hung et al., 2016). Therefore, identifying the real causes of suspension/withdrawal of college students to reduce the number and ratio of suspension/withdrawal is urgent. Hung et al. (2016) proposed a decision model based on the following hypotheses to reveal the real causes of suspension/withdrawal of college students in Taiwan.

H1: The major subject in high school significantly affects the mean number of applications to college.

H2: The application means are significantly affected by the department applied to.

H3: The department a student enrols in significantly affects their learning motivation.

H4: Learning motivation significantly affects class attendance and activity participation.

H5: Class attendance and activity participation significantly affect academic performance and achievement.

H6: Academic performance and achievement significantly affect the suspension/withdrawal from school.

H7: The students' grades significantly affect their reasons for suspension or withdrawal from school.

H8: The grade in which the students suspend their studies or withdraw from school significantly affects their choice to return to school or suspend their education.

ISSN 2055-0219(Print), ISSN 2055-0227(online)

Figure 1 shows a previously unseen or discussed decision model based on the above eight hypotheses (Hung et al., 2016). However, the decision model requires further verification.

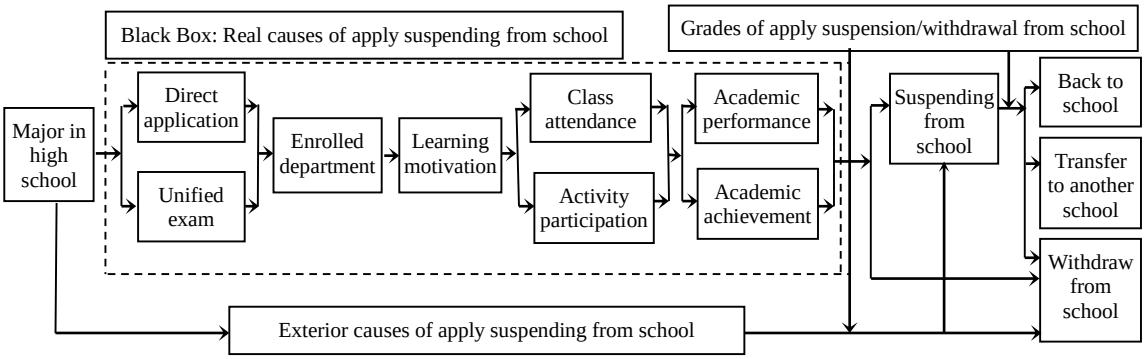

Figure 1. Decision model for suspension or withdrawal from school

LITERATURE REVIEW

A few studies have aimed to investigate the causes that might significantly affect application for suspension/withdrawal of college students using a qualitative method (Ko, 2014) or quantitative method (Zheng, 2013). They reported the major suspension/withdrawal causes were personal interests, aptitudes, and self-expectations; while the environmental causes include life stress, crisis situations, and family factors. It is very interesting that the major suspension/withdrawal causes were quite different between China and Taiwan. However, these might only be superficial causes, due to the lack of a thorough investigation of the reasons given.

METHODOLOGY

Structural equation modeling (SEM) is a useful tool in theory development because it allows the researcher to propose and subsequently test theoretical hypotheses about interrelationships among variables in a multivariable setting (Bollen, 1989). SEM includes confirmatory factor analysis, path analysis, partial least squares path analysis, and latent growth modeling. Structural equation models are often used to assess unobservable 'latent' constructs. Use of SEM is commonly justified in the social sciences because of its ability to impute relationships between unobserved constructs (latent variables) from observable variables (Hancock, 2003). Markus (2007) indicated SEM also refers to the use of a general framework for linear multivariate statistical analysis that includes as special cases less general models, such as linear regression, factor analysis, and path analysis.

The prototypical SEM includes several latent (unobserved) continuous variables, each measured by several manifest (observed) continuous variables (Markus, 2007). The latent variables typically serve as common factors for their manifest indicators. SEM allows the expression of all of these relationships within one inclusive model rather than requiring the researcher to break up the relationships into a series of discrete hypotheses tested by separate analyses. Like other latent variable models, SEM also allows researchers to estimate effect sizes controlling for measurement error.

ISSN 2055-0219(Print), ISSN 2055-0227(online)

Various methods in SEM have been used in the sciences (Gillespie and Perron, 2007), business (Markus, 2007), education (Shelley, 2006), and other fields.

Path analysis is an appropriate methodology for capturing relationships between variables because it is concerned with estimating the magnitude of the linkages between variables and using these estimates to provide information about underlying causal processes (Asher, 1983).

The present study employed path analysis to investigate the black box of the decision model for suspension/withdrawal of college students in Taiwan.

PRACTICAL DATA

The present study conducted eight manifest/latent variables (independent variable) and suspension/withdrawal (response variable). Table 1 lists the variables, their codes and descriptions.

Table 1: List of codes and descriptions of the variables

Variable	Code	Description
Major in high school	M	1: ordinary high schools; 2: vocational high schools.
Enter way	W	1: unified exam; 2: direct application.
Enrolled department	D	1: college of creative media; 2: college of applied human ecology; 3: college of information technology; 4: college of business and management; 5: college of engineering.
Learning motivation	L	1: number of absence > 5 or joined club < 1; 2: others.
Academic performance	A	1: average scale < 60 or professional licence < 1; 2: others.
Grade	G	1: apply at first grade; 2: apply at second grade; 3: apply at third grade; 4: apply at fourth grade; 5: apply when can't graduate.
Health cause	H	1: yes; 2: no.
Economic cause	E	1: yes; 2: no.
Suspension/Withdrawal	S/W	1: suspension; 2: withdrawal.

KS University is one of the best private colleges in Taiwan and has three systems which include a regular daytime, evening, and inter-term system. Table 2 showed the suspension/withdrawal

ISSN 2055-0219(Print), ISSN 2055-0227(online)

data of the regular daytime system during 2012-2014 of KS University.

Table 2. Suspension/withdrawal data of regular daytime system

Year	Number of students	Number of suspension/withdrawal	Ratio
2012	9,598	795	8.28%
2013	9,951	822	8.26%
2014	10,490	779	7.43%

The focal point in analyzing structural equation models is the extent to which the hypothesized model 'fits' or, in other words, adequately describes the sample data. In assessing model adequacy we use three recommended tests: the root mean square error of approximation (RMSEA, Tennant and Pallant, 2012), the normed fit index (NFI, Bentler and Bonett, 1980), and the comparative fit index (CFI, Bentler, 1990).

RESULTS

We tabulated the means, standard deviations (S.D.), and the ranks of the significance variables (Table 3). With reference to data in Table 3, a key issue is the degree of association between suspension and withdrawal. The calculated Spearman rank correlation coefficient for the two groups is 0.771, indicating a high degree of association.

Table 2. The means, standard deviations (S.D.), and the ranks of the significance variables

Variable code	Suspension			Withdrawal		
	mean	S.D.	rank	mean	S.D.	rank
W	1.4577	0.4984	5	1.4357	0.4961	6
L	1.9655	0.1827	2	1.8593	0.3478	4
A	1.4016	0.4904	6	1.4697	0.4993	5
H	1.9447	0.2286	3	1.9968	0.0568	2
E	1.9318	0.2522	4	1.9960	0.0635	3
G	3.5285	1.5215	1	2.4713	1.2753	1

Figure 2 shows the significant path coefficients for the suspension/withdrawal decision model of students during the past three years of KS University. The test results (RMSEA, NFI, and CFI value) indicated the theory model is supported.

ISSN 2055-0219(Print), ISSN 2055-0227(online)

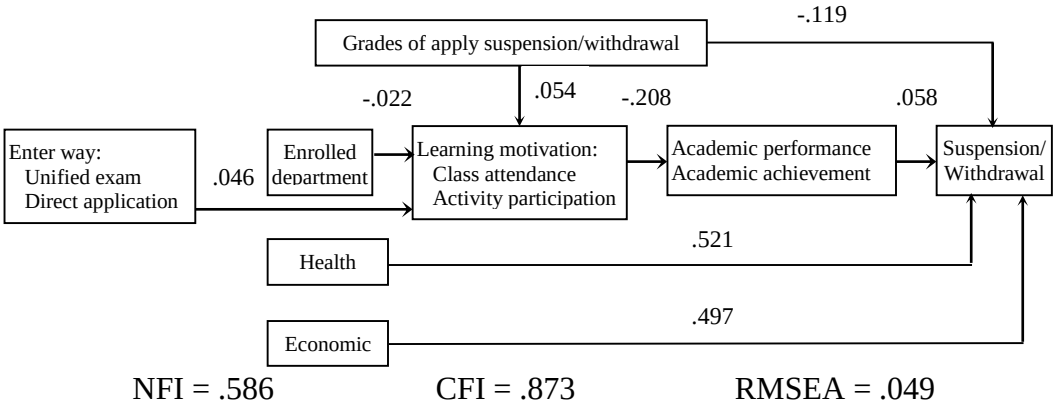

Figure 2. Significant path coefficients (p<0.05) for suspension/withdrawal

To double check the significant path relationships between the variables, the present study also perform chi square (χ^2) to test of the goodness of fit of two correlation variables (Cochran, 1952). Tables 4 to 11 show the contingency data between the significant correlation variables and the χ^2 test results.

Table 4. Contingency of the entrance path and learning motivation

Variable	Entrance path	Learning motivation	Number of students
Code	1	1	145
	1	2	1181
	2	1	70
	2	2	1000

The χ^2 = 13.99 (p-value = 0.0002) of goodness of fit indicates the difference between the two correlation variables is significant, i.e., the learning motivation was significantly affected by the entrance path. Students entering colleges by unified exam had lower learning motivation than those entering through direct application.

Table 5. Contingency of the enrolled department and learning motivation

Variable	Enrolled department	Learning motivation	Number of students
Code	1	1	31
	1	2	467
	2	1	16
	2	2	260
	3	1	19
	3	2	387
	4	1	48
	4	2	513
	5	1	101
	5	2	554

ISSN 2055-0219(Print), ISSN 2055-0227(online)

The χ^2 = 46.80 (p-value = 0.0000) of goodness of fit indicates the difference between the two correlation variables is significant, i.e., the learning motivation was significantly affected by the enrolled department. Generally, students enrolled by the college of engineering had lower learning motivation.

Table 6. Contingency of the learning motivation and academic performance

Variable	Learning motivation	Academic performance	Number of students
Code	1	1	80
	1	2	135
	2	1	1269
	2	2	912

The χ^2 = 34.99 (p-value = 0.0000) of goodness of fit indicates the difference between the two correlation variables is significant, i.e., academic performance was significantly affected by learning motivation. Generally, students with better learning motivation had better academic performance. Moreover, more than half of the students who applied for suspension/withdrawal had high learning motivation but low academic performance. This result requires further investigation.

Table 7. Contingency of academic performance and Suspension/Withdrawal

Variable	Academic performance	Suspension/Withdrawal	Number of students
Code	1	1	693
	1	2	656
	2	1	465
	2	2	582

The χ^2 = 11.43 (p-value = 0.0007) of goodness of fit indicates the difference between the two correlation variables is significant, i.e., the suspension/withdrawal decision was significantly affected by academic performance. Generally, students with better academic performance resulted showed lower rates of suspension/withdrawal.

Table 8. Contingency of the health cause and suspension/withdrawal

Variable	Health cause	Suspension/Withdrawal	Number of students
Code	1	1	64
	1	2	4
	2	1	1094
	2	2	1302

The χ^2 = 62.86 (p-value = 0.0000) of goodness of fit indicates the difference between the two correlation variables is significant, i.e., generally, most students applying for suspension/withdrawal had not done so because of health reasons.

ISSN 2055-0219(Print), ISSN 2055-0227(online)

Table 9. Contingency of the economic cause and suspension/withdrawal

Variable	Economic cause	Suspension/Withdrawal	Number of students
Code	1	1	80
	1	2	5
	2	1	1084
	2	2	1312

The χ^2 = 78.74 (p-value = 0.0000) of goodness of fit indicates the difference between the two correlation variables is significant, i.e., generally, most students applying for suspension/withdrawal had not done so because of economic causes.

Table 10. Contingency of the grades and learning motivation

Variable	Grades	Learning motivation	Number of students
Code	1	1	107
	2	1	89
	3	1	13
	4	1	3
	5	1	3
	1	2	340
	2	2	611
	3	2	348
	4	2	223
	5	2	659

The χ^2 = 214.42 (p-value = 0.0000) of goodness of fit indicates the difference between the two correlation variables is significant, i.e., the learning motivation was significantly affected by the grades. Generally, students with higher grades had better learning motivation.

Table 11. Contingency of the grades and suspension/withdrawal

Variable	Grades	Suspension/Withdrawal	Number of students
Code	1	1	163
	2	1	200
	3	1	163
	4	1	126
	5	1	506
	1	2	284
	2	2	500
	3	2	198
	4	2	100
	5	2	156

ISSN 2055-0219(Print), ISSN 2055-0227(online)

The χ^2 = 246.16 (p-value=0.0000) of goodness of fit indicates the difference between the two correlation variables is significant, i.e., the suspension/withdrawal decision was significantly affected by the grades. Generally, students with higher and lower grades resulted in higher rates of suspension and withdrawal, respectively. This might be due to the student transferring to another school. In contrast, if the students could not graduate within four years, then the students usually applied for a suspension.

Table 12. Contingency of the entrance path and enrolled department

Variable	Entrance path	Enrolled department	Number of students
Code	1	1	311
	1	2	139
	1	3	211
	1	4	277
	1	5	388
	2	1	187
	2	2	137
	2	3	195
	2	4	284
	2	5	267

The path coefficients between the entrance path and enrolled department did not reach a statistically significant level. However, the χ^2 = 19.19 (p-value = 0.0007) of goodness of fit indicates the difference between the two correlation variables is significant, i.e., the enrolled department was significantly affected by the entrance path. The result indicated most students entered the college of creative media by unified exam. However, this result was unexpected because the college of creative media usually focuses on technical subjects and practicum courses (eg. sketch and aquarelle) in the admission selection.

Table 13. Contingency of the major in high school and entrance path

Variable	Major in high school	Entrance path	Number of students
Code	1	1	465
	1	2	409
	2	1	861
	2	2	661

The path coefficients between the major in high school and entrance path did not reach a statistically significant level. The χ^2 = 2.55 (p-value = 0.1106) of the goodness of fit also indicates the difference between the two correlation variables is insignificant, i.e., the entrance path was insignificantly affected by the major in school. This result is unexpected because vocational high schools might pay more attention to practicum courses but ordinary high schools do not.

ISSN 2055-0219(Print), ISSN 2055-0227(online)

CONCLUSION

The present study verified the decision model of college students' suspension/withdrawal from school in Taiwan based on empirical data. The paper provides an illustrative empirical study that employs path analysis to test the relationship among the decision black box for applying to school, suspending studies, returning to school, transferring to another school, and withdrawal of college students in Taiwan. The results indicated the decision model accurately reflects the actual situation in current Taiwan. The following shows the results of the present study:

1. Learning motivation was significantly affected by the entrance path. Students entering colleges by unified exam had lower learning motivation than direct application.
2. Learning motivation was significantly affected by the enrolled department. Generally, students enrolled in the college of engineering had lower learning motivation.
3. Academic performance was significantly affected by learning motivation. Generally, students with better learning motivation had better academic performance.
4. The suspension/withdrawal decision was significantly affected by academic performance. Generally, students with better academic performance had lower rates of suspension/withdrawal.
5. Most students' suspension/withdrawal was not due to health or economic causes.
6. Learning motivation was significantly affected by the grades. Generally, students with higher grades had better learning motivation.
7. The suspension/withdrawal decision was significantly affected by the grades. Generally, students with higher and lower grades resulted in higher rates of suspension and withdrawal, respectively.
8. The enrolled department was significantly affected by the entrance path.
9. The entrance path was insignificantly affected by the major in school.

REFERENCES

Asher, H. B. (1983) Causal modelling, No.3, Newbury Park: Sage Publication.

Bentler, P. M. (1990) Comparative fit indexes in structural models. Psychological Bulletin, 107(2), 238-246.

Bentler, P. M. & Bonett, D. G. (1980) Significance tests and goodness of fit in the analysis of covariance structures. Psychological Bulletin, 88(3), 588-606.

Bollen, K. A. (1989) Structural equations with latent variables, New York, John Wiley & Sons.

Cochran, W. G. (1952) The $\chi 2$ test of goodness of fit. The Annals of Mathematical Statistics, 315-345.

Gillespie, D. F. & Perron, B. (2007) Structural equation modelling, in Boslaugh, S., Encyclopedia of Epidemiology, Sage publications, 1004-1008.

Hung, C,-M., Chung, C.-Y., Su, Y.-K. & Lin, C.-C. (2016) Decision model of suspension or withdrawal of college students in Taiwan: Constructing a conceptual model, British Journal of Education, 4(3), 89-98.

ISSN 2055-0219(Print), ISSN 2055-0227(online)

Hancock, G. R. (2003) Fortune cookies, measurement error, and experimental design, Journal of Modern Applied Statistical Methods, vol.2, no.2, article 3.

Huang, H. (1991) Investigation and analysis of suspending schooling and leaving school for college student cause of health and death within resent 11 years, Journal of China Clinical Research, 2(7).

Ko, W.-H. (2014) choice course and adaptation connotation, Unpublished Master Thesis, Department of Guidance and Counselling, National Chi Nan University, Taiwan. (in Chinese).

Markus, K. A. (2007) Structural equation modelling, in Rogelberg, S., Encyclopedia of Industrial and Organizational Psychology, Sage publications, 774-776.

Shelley, M. (2006) Structural equation modelling, in Fenwick W., Encyclopedia of Educational Leadership and Administration, Sage publications.

Tennant, A. & Pallant, J. F. (2012) The root mean square error of approximation (RMSEA) as a supplementary statistic to determine fit to the Rasch model with large sample sizes. Rasch Measurement Transactions, 25(4), 1348-1349.

Zheng, G.-S. (2013) Construct the generalize associate classification multiple support system to predict the college withdraw, Unpublished Master Thesis, Department of Information Engineering, National Kaohsiung University, Taiwan. (in Chinese).

ISSN 2055-0219(Print), ISSN 2055-0227(online)