RESEARCH ARTICLE          OPEN ACCESS

# Analysis of Modeling Factors that Influence Achievements in IncreasingCompetitiveness of the College Graduates Case study: 53<sup>rd</sup> batch IPB Undergraduate Students

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**ABSTRACT**
Achievements matters the most in order to achieve the success. Many empirical studies are conducted to explore the factors that influence achievement at the college level. This study aims to analyze the influence of motivational factors, individual competencies, and environment on student achievement, as well as construct structural equation models to see the patterns of inter-relationships between the three factors. This study involved 136 respondents, who were first-level students of class 53 of the Bogor Agricultural Institute. An online structured questionnaire is distributed to 136 respondents. Analysis of the data used is SPSS and Lisrel 8.8 software, as well as the structural equation model method in modeling analysis. The results show that motivational and environmental factors are significant affecting the achievement of class 53 IPB students. Dominant factors and significant effect on endogenous latent variables of motivation and environmental factors.This research is expected to help and provide useful guidance for both IPB campus policy makers and parents of students to design and implement the policies in improving student achievement. It is also important to improve the academic quality of future generation to be ready to compete and fulfill the requirements of the world of work.
**Keywords:**Individual competency, environment, structural equation model, motivation, achievement.

## I. INTRODUCTION

Achievements in the Kamus Besar Bahasa Indonesia are defined as the results that have been achieved from what has been done. Achievement is one of the conditions in which a person reaches at a certain standard. Everyone is expected to want to reach the best position or have a good achievement. This is because someone with good achievements shows pride in themselves, their families, society, nation and country. Meanwhile the academic in the Kamus Besar Bahasa Indonesia is defined as the results of lessons obtained from learning activities in schools or colleges that are cognitive in nature and are usually determined through measurement and assessment. It can be said that academic achievement is a term to show an achievement level of success and goal because of learning effort which has been carried out by someone optimally [6].

Student academic achievement is one of the conditions desired by students everywhere, because academic achievement shows an achievement and becomes one of the targets of students. Regarding the development of technology or the labor market, academic achievement is a demand that must be achieved by a student in order to meet the needs of the work industry. Therefore, the scope of this research is to analyze the factors influence student academic achievement. Previous studies show that student academic performance depends on the difference in socio-economic, psychological and environmental factors.

The research [5] focused on learning strategy factors, internet and campus technology, teaching quality, overall college experience, and student interaction with faculty. The findings concluded that learning strategy factors, teaching quality, overall college experience, and student interaction with faculty significantly influence academic achievement. While internet and campus technology factors have a negative relationship to academic achievement. Furthermore, in the Pakistani scenario, the study of [2] showed that there is a relationship between maternal education factors, class attendance, parental income level, and allocation of study time to student academic achievement. The research of [3] further explained that communication factors, learning facilities, and appropriate guidance had a positive impact on student academic achievement. While family

pressure factors have a negative impact on student academic achievement. Thus, it was concluded that the factors that affect student academic achievement are grouped into two, namely external and internal factors. External factors include internet and campus technology, teaching quality, student interaction with faculty, maternal education, parental income level, learning facilities, appropriate guidance, and family pressure. While internal factors include communication, overall college experience, class attendance, and allocation of study time.

Achievement is an accumulation of various factors, where these factors are interrelated or interact and it is needed to see the causality run between the variables. The model used in this study, namely structural equation models or commonly known as SEM models. This SEM model is a statistical technique used to construct and test the statistical models that are usually in the form of causality models.

This study focuses only on three factors, namely motivation, individual competency, and environment, while taking into account all the factors discussed by different researchers. The measurement of motivational factors is based on the teaching method of the lecturer during the lecture process, the attitude of the lecturer, the pressure to get a university degree, competition between classmates, moral and financial support from parents, and the suitability of the chosen study program. Individual competency factors are measured based on the competence in English, public speaking, and expertise in five fields (academic, artistic, sports, social, religious). Environmental factors are measured on the condition of the dormitory, campus facilities, the condition of the lecture hall, and the condition of the practicum room. While achievement is measured based on GPA from semester 1 to 4.

Based on the description of the problem above, this study aims to, 1) analyze and find out the influence of the motivational factors, individual competencies, and the dominant and significant environment on the achievement of the 53rd batch of IPB S1 students, 2) build structural equation models and see patterns of association between motivational factors, individual competencies, and the environment towards the achievement of 53rd batch IPB S1 students. This research is expected to help and provide useful guidance for both IPB campus policy makers and parents of students to design and implement the policies in improving student achievement. It is also important to improve the academic quality of future generation to be ready to compete and fulfill the requirements of the world of work. In addition, the role of parents is

also expected to be able to guide their children well.

## II.    METHODS

This study focuses on 3732 students of the 53rd batch of IPB (2016/2017 academic year) who are used as population target. In this study, it is known that the number of population is large, therefore the formula used is as follows [2]:

$$n = \frac{NZ^2 \times 0.25}{[d^2 \times (N-1)] + [Z^2 \times 0.25]} \quad (1)$$

Based on the calculation results, the sample size is about 136 respondents. The primary data is collected through an online structured questionnaire (bit.ly website) distributed through the WhatsApp application to 136 respondents that was conducted from August to October 2018.

**Stages of Research**

1.    Secondary data collection, namely data on the number of all undergraduate students batch 53rd IPB (2016/2017 academic year).

2.    Research planning:

a.    Making a website with the site name, namely bit.ly/TestDince.

b.    Making a structured questionnaire.

3.    Primary data collection. At this stage the researcher distributes structured questionnaires online through a website that has been made previously (point 2 item a) to 136 respondents.

4.    Analysis of descriptive data.

5.    Data analysis, at this stage analysis of sample data with Lisrel 8.8 software. The steps taken are as follows:

a.    Formulate a model.

b.    Creating an input matrix is a correlation matrix using the PRELIS program package.

c.    Model identification. At this stage it is expected that the tested model is a model that is "just-identified" (df = 0) or "over-identified" (df> 0), where:

$$df = \frac{1}{2}(p + q)(p + q + 1) - t \quad (2)$$

d.    Estimating model parameters with ULS parameter estimation method.

e. Analysis of measurement models. At this stage the reliability test is done by calculating the value of construct reliability (CR= $\frac{(\sum \text{std.loading})^2}{(\sum \text{std.loading})^2 + \sum e_i}$ ) and evaluating the feasibility of the model based on the test of goodness of the model: GFI, AGFI, RMSEA, CFI.

f. Testing the model coefficient with the T-test.

g. Respecification of the model (modification). This stage aims to find a model that is as simple as possible and get a model that matches the data and is able to explain the phenomenon under study.

6. Interpretation of results.

## III.     RESULT AND DISCUSSION

### 3.1 Demographic profile of respondents

The average age of respondents ranged between 18-21 years. This research is quite proportional in the sampling. Based on gender, about 40.4% of respondents were male, while 59.6% of respondents werefemale.Therefore, most of respondents are 20 years old and female

### 3.2 Education information of respondents

**Table 2** Percentage of origin of school respondents

| Origin of School | Percentage |
|---|---|
| Sumatra Island and its surroundings | 24.3% |
| Bali/Nusa Tenggara Island and its surroundings | 0.7% |
| Kalimantan Island and surroundings | 2.2% |
| Java Island and its surroundings | 70.6% |
| Sulawesi Island and its surroundings | 2.2% |

Table 2 describes the education information of respondents. It showed that the majority of respondents were still dominated by students from Java and there were still very few students from eastern Indonesia who studied at IPB. Student achievement success is indicated by a GPA that is generally obtained through a lecture process for a certain period, and is measured by the assignments given by the Lecturer, midterms, final semester exams, and activeness in the classroom. The data in Figure 2 and Figure 3 show that the majority of respondents have a high enough GPA, which is GPA ≥ 3.50. Based on the respondent's GPA from semester 1 - 2 in Figure 2, most of the respondents got a GPA ≥ 3.50, which is a percentage of 38.2%, respondents with GPA in intervals of 3.25 - 3.50 as many as 19.1%, respondents with GPAs at intervals 3.00 - 3.25 as many as 26.5%, respondents with GPA that are in intervals of 2.75 - 3.00 as many as 9.6%, and respondents with GPA <2.75 as many as 7.4%.
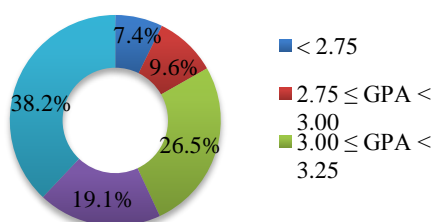


**Figure 2** Percentage of respondents' GPA from semester 1 to 2

Based on respondents' GPA from semester 1 - 4 in Figure 4, the largest percentage is still dominated by respondents with GPA ≥ 3.50 which is equal to 31.6%. ss many as 21.3% of respondents with GPA in the interval of 3.25 - 3.50, as many as 22.8% of respondents with GPA in the interval 3.00 -3.25, as many as 16.2% of respondents with GPA in the interval of 2.75 - 3.00, and respondents with GPA <2.75 as much as 8.1 %.
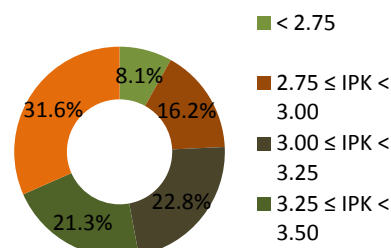


**Figure 3** Percentage of respondents' GPA from semester 1 to 4

### 3.3 Model identification

Model identification is carried out by examining the number of indicator variables in the model $(p + q)$ and the number of coefficients of the estimated model (t). The model tested is expected to be a just-identified model (df = 0) or over-identified (df> 0). However, the most preferred model is the model that is over-identified. In this study the initial model tested has df = 633 and the model after modification has df = 73. It means that the expected model has been fulfilled (df> 0).

### 3.4 Structural model of achievement (before modification)

The model in Figure 4 consists of three exogenous latent variables, namely motivation, individual competence, and environmental factors. While, the endogenous latent variables namely achievement. Variables X1 – X13 are indicator variables for exogenous latent is motivational variables. Variable X14 – X22 is indicator variables for exogenous latent variables of individual competence. Variable X23 – X37 is indicator variables for exogenous latent variables of environmental factors. While variable Y1 is an indicator variable for endogenous latent variables of achievement. Based on the modeling analysis using Lisrel 8.8 software, several indicators were obtained with the factor loading value still below 0.5. Loading factor is a value that states the relationship between latent variables and indicator variables. This has an effect on the results of the

feasibility test of the initial model, where the value obtained does not meetthe criteria of ideal values. Therefore, it is necessary to modify the model in order to get a better model (the values obtained meet the criteria of ideal values). Table 3 presents the results of the feasibility test of the initial model of achievement with ULS parameter estimates.
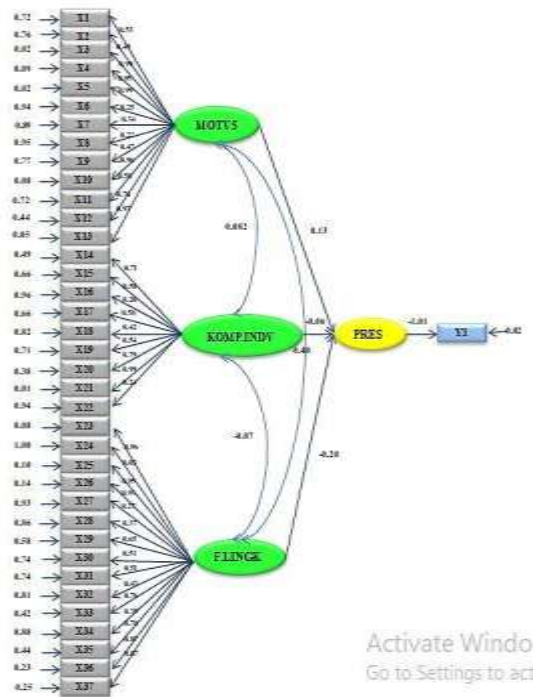


**Chi-square=1234.18, df=633, P-value=0.00000, RMSEA=0.084**

**Figure 4** The structural model of achievement (initial)

Notes:
MOTVS : Motivation
KOMP.INDV : Individual competency
F.LINGK : Environmental factor
PRES : Achievement

**Table 3** The results of the feasibility test of the initial model of achievement

| Criteria of test | Ideal value | Value obtained |
|---|---|---|
| Chi-square | Relatively small (p≥0.075) | 1234.18 (p=0.00) |
| RMSEA | ≤ 0.08 | 0.0838 |
| GFI | ≥ 0.90 | 0.8038 |
| AGFI | ≥ 0.90 | 0.7703 |
| CFI | ≥ 0.90 | 1.0000 |

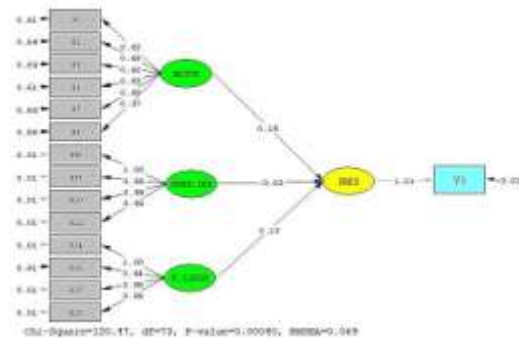### 3.5 Modification of the model



**Figure 5** Results of modification of the structural model of achievement

The modification of the model has been done (Figure 5), namely by issuing several indicators, namely X3, X4, X9, X10, X11, X12, X13, X14, X15, X16, X17, X21, X23, X25, X29, X30, X31, X32, X33, X34, X35, X36, and X37.

**Table 4** Feasibility test results of the modified model

| Criteria of test | Ideal value | Value obtained |
|---|---|---|
| Chi-square | Relatively small (p≥0.075) | 120.465 (p=0.00040) |
| RMSEA | ≤ 0.08 | 0.0694 |
| GFI | ≥ 0.90 | 0.9303 |
| AGFI | ≥ 0.90 | 0.8855 |
| CFI | ≥ 0.90 | 1.0000 |

In Table 4, the results show that of the model feasibility test have fulfilled the criteria of ideal values. The feasibility test value of the model shows that the data empirical state is in accordance with the model, which means that the model is feasible.

### 3.6 Realiability of test (construct reliability)

Calculation of construct reliability (CR) is done to find out how reliable each indicator variable is able to explain its latent variables. The recommended value for CR is greater than 0.7 [1].

**Table 5** Value construct reliability of latent variable of motivation

| Indicator variables | Std.loading | $e_i$ | T-value | CR |
|---|---|---|---|---|
| X1 | 0.62 | 0.61 | 11.33* | |
| X2 | 0.68 | 0.54 | 9.73* | |
| X5 | 0.60 | 0.64 | 10.41* | |
| X6 | 0.63 | 0.61 | 10.64* | 0.35 |
| X7 | 0.60 | 0.64 | 9.94* | |
| X8 | 0.37 | 0.86 | 5.46* | |

*T value is significant with α=0.075

**Table 6** Value construct reliability of latent variable of individual competency

| Indicator variables | Std.loading | $e_i$ | T-value | CR |
|---|---|---|---|---|
| X18 | 1.00 | 0.01 | 17.65* | |
| X19 | 0.99 | 0.01 | 15.43* | 0.9 |
| X20 | 0.99 | 0.01 | 12.64* | 8 |
| X22 | 0.99 | 0.01 | 11.57* | |

*T value is significant with α=0.075

**Table 7** Value construct reliability of latent variable of environment factor

| Indicator variables | Std.loading | $e_i$ | T-value | CR |
|---|---|---|---|---|
| X24 | 1.00 | 0.01 | 18.55* | |
| X26 | 0.44 | 0.81 | 5.10* | 0.79 |
| X27 | 0.99 | 0.01 | 17.16* | |
| X28 | 0.99 | 0.01 | 15.90* | |

*T value is significant with α=0.075

Based on Tables 5, 6, and 7, it shows that the variables of individual competency indicators and the environment are reliable in reflecting the latent variables (CR values have fulfilled the recommended values). While the CR value for motivational variables does not fulfill the recommended value, which is equal to 0.35. It is because there are still indicators of pressure to get a university degree (X8) with a factor loading value is below 0.5.

### 3.7 Analysis of structural models

The results of the analysis of structural models presented in Table 8 show that from the three exogenous latent variables, namely motivation, individual competence and environmental factors, only are motivation and environmental factors significant and dominant towards endogenous latent variables of achievement. This is based on the T-value that is greater than the T-table (1.78).

**Table 8** Results of analysis of structural models of achievement

| Latent variables | Cross coefficient | T-value |
|---|---|---|
| Motivation → Achievement | 0.19 | 2.72* |
| Individual competency → Achievement | −0.02 | −0.35 |
| Environmental factor → Achievement | 0.13 | 2.26* |

*T value is significant with α=0.075

### 3.8 Interpretation of the results of coefficients across structural models
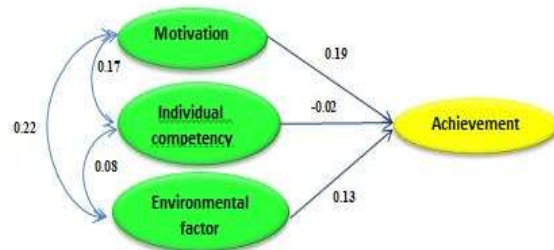


**Figure 6** Results of estimating coefficients across structural models

a. Effect of motivation on achievement

The coefficient of cross motivation is 0.19, which means that the increased in motivation will increase student achievement. The direct effect of motivation on achievement is $(0.19^2) = 0.0361$ or 3.61%. These results indicate that 3.61% increase in student performance is directly caused by an increase in motivation. While motivation is indirectly influenced by individual competence and environmental factors where they are equal to $(0.19 \times 0.17 \times 0.08) + (0.19 \times 0.22 \times 0.13) = 0.008018 = 0.8018\%$. Thus, the total effect of motivation on achievement is 4.41%.

b. Effect of individual competence on achievement

The coefficient across individual competencies is 0.02 with a negative direction, meaning that the lower the individual's competency, the lower the student's performance. The direct influence of individual competence on achievement is approximately $(-0.02)^2 = 0.0004$ or 0.04%. While individual competence is indirectly influenced motivation and environmental factors which are equal to $(-0.02 \times 0.17 \times 0.19) + (-0.02 \times 0.08 \times 0.13) = -0.000854 = -0.0854\%$. Thus, the total effect of motivation on achievement is -4.54%.

c. Effect of environmental factors on achievement

The coefficient of crossing environmental factors is 0.13 with a positive direction, meaning that increasing environmental factors will increase student achievement. Achievement is directly affected by environmental factors with value of $(0.13)^2 = 0.0169$ or 1.69%. These results indicate that 1.69% increase in student performance is directly caused by an increase in environmental factors. While, environmental factors is indirectly with individual motivation and competency of $= (0.13 \times 0.22 \times 0.19) + (0.13 \times 0.08 \times (-0.02)) = 0.005226 = 0.5226\%$. Thus, the total effect of motivation on achievement is 2.21%.

## IV. CONCLUSIONS AND SUGGESTION

### Conclusion

Based on the three exogenous latent variables studied, namely motivation, individual competence, and environmental factors. The factors which are dominant and significant effect on endogenous latent variables is motivation and environmental factors. The dominant indicators in explaining motivation include building a positive atmosphere by a lecturer during the lecture (X1), a good relationship between lecturers and students during the lecture process (X2), delivery of material of study by lecturer (X5), presenting the lecture material slides that is interesting (X6), and a competition for achievements between classmates (X7). While the dominant indicators in explaining environmental factors such as roommate support (X24), cleanliness of the dormitory lobby (X27), and cleanliness of the dormitory hall (X28). In addition, based on the results of the calculation of the coefficients across the structural models, the greatest influence is motivation. This is reasonable because motivation is an encouragement, cause, or reason for someone doing something and leading to certain results. If someone has a positive motivation then someone will show interest and will continue to try to do it. While the smallest influence is individual competence. This shows that there is no linear relationship between competence in public speaking, English and social skills in achievement. Suppose that students who are not accustomed to public speaking or passive in speaking in English has no effect on achievement. However, the even though the competence possessed is low but the motivation is high, this can have an effect in improving achievement.

### Suggestion

The results of this study can be used as an evaluation to improve the achievements of IPB students by giving important attention to the teaching and learning process in the classroom, focused on teaching methods from lecturers. This can specifically encourage higher motivation so that it can affect achievement. In addition, it is also necessary to pay attention to the dormitory environment of IPB, specifically on the cleanliness of the dormitory lobby and hallway. This is because the dormitory lobby and hallways are often used for learning activities. The clean condition of the lobby and dormitory hall will make IPB students comfortable to study and moreover can improve their achievements.

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