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Measuring Factors Effecting MBA Students' Academic Performance by Using Categorical Regression Analysis: A Case Study of Institution of Business Economics, Istanbul University

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Abstract

Education institutions worldwide have always given a great emphasis on the factors governing the performance of their students. There have been many studies that sought to examine this issue and most of these studies have focused on pointing out the hard work, demographic variables (education, income, age, marital status), self-motivation as factors that have a significant effect on the MBA student's academic performance. Besides these factors, some social (student-class mates relationships, student-lecturer relationships), individual (work experience, skills) and organizational (location, work atmosphere, technology facilities) factors are assumed to have effect on MBA student's academic success.

The aim of this study is to determine some factors effecting MBA Students' performance at Institution of Business Economics of Istanbul University. Accordingly, demographic, social, individual and organizational factors are studied. A survey is conducted to collect the data. Categorical Regression Analysis (CATREG) is applied as Statistical Method. CATREG is an optimal scaling method and can be used when the dependent variable and also the independent variables are any combination of numeric, nominal and ordinal. Categorical regression quantifies categorical data by assigning numerical values to the categories, resulting in an optimal linear regression equation for the transformed variables.

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1. Introduction

Istanbul University Institute of Business Economics has been founded with the attempts of two important frontier of Turkish business life; Vehbi Koc and Nejat Eczacibasi with academic support of Harvard Business School and finance of the Ford Foundation in 1954. With the "Specialized Business Program" in 1957, the Business Administration education was started. The mission of the Institute is to educate leader managers in coordination with the business environment, high quality academic staff and efficient education programs. The aim was to breed businessmen who are capable, creative, self-confident, inquisitive, and self-evolved, with broad perspective and sense of social responsibility. For this purpose the institute started MBA programs both in English and Turkish languages and also Executive MBA, MS on Finance, Health and Hospital Management, Human Resources Management, Management Information Systems, Quality Management, Logistic Management and Transportation,

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Marketing, Accounting and Auditing and Management & Organization. Institute of Business Economics has been evaluated and accredited together with Istanbul University School of Business by AACSB (The Association to Advance Collegiate Schools of Business) in 2012.

2. Factors Effecting MBA Student's Academic Performance

Studies aiming to define the success factors of the MBA students date back to 1970's. Deckro and Woudenberg's study is accepted as one of the basic studies on this topic (Deckro and Woudenberg, 1977). It was searched if the acceptance criteria could be a base to predict the MBA students graduate program success. In this study, GMAT and undergraduate GPA found to be the most important factors to determine the MBA success. In Wright and Palmer's study, the students are grouped in four different levels according to their graduate GPA's and for the middle group the significant factors for success also found to be GMAT scores and undergraduate GPA's. Talento and others also determine GMAT as the best factor to predict MBA success (Talento et.al., 2008). Fisher and Resnick found out that the GMAT is the best indicator to predict first year graduate GPA (Fisher and Resnick, 1990). To be able to predict graduate GPA (GGPA), addition to GPA "Used background, activities and personal qualities (BAPQ) scale was developed and used (Sobol, 1984). Addition to GMAT and undergraduate GPA some latent variables such as attention, diligence are denoted to be affective on GGPA (Sireci, 2006). It is also found that GPA and GMAT is an indicator for Executive MBA students' success (Siegert, 2008). Zwick has demonstrated that GPA alone is a better indicator than GMAT verbal (GMATTV) and GMAT quantitative (GMATQ) by using Bayer Regression (Zwick, 1993). Some studies also explore the effect of gender but gender as an indicator has not been found to be significantly effective on success (Sulaiman and Mohezar, 2006; Peiperl and Trevelyan, 1997)

3. Research Method: Categorical Regression Analysis

Ordinary Linear Regression models could be used only when the dependent variable is quantitative and predictive variables are either quantitative or dummy. But in most of the cases, predicting variables from survey data are categorical. In this case dummy binary variables have to be designed to apply traditional linear regression but the results would be hard for interpretation and impossible for further recalibration. In such situations, Categorical Regression Analysis could be preferred as an alternative modeling method.

Categorical Regression Analysis (CATREG) is a non-parametric multiple regression analysis could be implemented when variables are all categorical or both categorical and numeric. CATREG's logic bases on the non-linear transformation of dependent and independent variables. CATREG is also the name of the program in SPSS that uses the Categorical Regression Analysis algorithm (Van der Kooij and Meulman, 1999). In this analysis, categorical variables are quantified by using optimal scaling, in order to reach the optimal regression model coefficients. "Optimal Scaling" is the quantification method of the variant variables in Gifi system (Gifi, 1990). Determining the quantitative values for the variable categories, alternating least squares (als) iterative prediction method is used. The value determination after optimal scaling can be saved as a new variable set.

With the results from CATREG, it is still required to verify the statistical significance of the predictors. Consequently CATREG is equivalent to an ordinary linear regression when the qualitative predictors are substituted by the transformed (quantified) values (Caprez and Ho, 2010). In this study, stepwise method used to prevent possible Multicollinearity problem in the linear multiple regression model formed by transformed variables.

4. Data

In order to determine and evaluate the factors effecting on the academic success, a survey consist of 23 questions was prepared and conducted to MBA students before their graduation. The research has been done with 99 valid responses. The Survey consists of three parts. The first part has the demographic variables such as, age, gender, marital status, income level and working status. The second part has the variables which represents the academic success of the participants before their MBA studies such as; the graduate program that they enrolled (social science

or science), under graduate GPA, ALES score and ALES Score type (verbal, equiponderant, quantitative) (ALES is the equivalent exam of GMAT in Turkey which is used for enrollment in graduate programs). In the last part, there are social, individual and organizational factors may be affecting students' success. These factors have been measured with 3 point Likert Scale Statements (1- disagree, 2- no idea and 3-agree).

5. Empirical Results of CATREG

CATREG was performed to the 20 qualitative and 3 quantitative independent variables with the MBA grade point average (GPA) as the dependent variable. The results showed that all of the independent variables except Age, attendance rate, undergraduate grade point average (UGPA), ALES score type, "I can ask the lecturer anything I cannot understand about the course", "Institutes computer laboratory is sufficient" and "Transportation is easy to the Institute" statements were insignificant. Then stepwise linear regression to the data with the resulted quantifications was applied and the summary results with the significant variables were presented in Table 1 and Table 2. The model variables are named as; MBA grade point average (MBAGPA), age (AGE), attendance rate (ATTRAT), Undergraduate Grade Point Average (UGPA), ALES Type (ALESTYP), ALES score (ALES), marital status (MARSTAT), "I can ask the lecturer anything I cannot understand about the course" statement (S1), "Institutes computer laboratory is sufficient" statement (S2) and "Transportation is easy to the Institute" statement as (S3).

Table 1. Model Summary of Stepwise Linear Regression with Transformed Variables

R	R Square	Adjusted R Square	Sig.
0.84	0.706	0.553	0.000

Table 2. Coefficients of CATREG Model

Model	Unstandardized Coefficients	Sig.
Constant	1.97E-016	1,000
AGE	0.599	,000
ATTRAT	0.392	,000
UGPA	0.468	,000
ALESTYP	0.284	,000
ALES	0.329	,000
MARSTAT	0.215	,003
S1	0.186	,007
S2	0.341	,000
S3	0.174	,011

The coefficients were listed in Table 2 and all of them were significant. Stepwise linear regression model was applied to the transformed variables that results the standardized and unstandardized coefficients to be the same. Because of this, unstandardized coefficients could be interpreted. According to these results, the success factors effecting MBA student's academic success are; age, undergraduate GPA, attendance rate, S2, ALES, ALES type, marital status, S1 and S3 by this order.

Since the stepwise method was used, there is no Multicollinearity problem. Other assumption of the regression was also checked. In order to check Heteroskedasticity problem, Spearman Rank Correlation test was applied. Spearman Rank Correlation coefficient calculated between absolute error terms and predicted values is insignificant and (H_0: there is no heteroskedasticity problem) hypothesis could not be rejected at 0.607 significant level.

In order to see if the model error terms have a normal distribution, Kolmogorov-Smirnov test is used and (H_0: Error terms are normally distributed) hypothesis could not be rejected at 0.20 significant level. According to these results, this regression model satisfies the classical regression model assumptions.

6. Conclusion and Future Work

CATREG analysis is an alternative model to Ordinal Linear Regression Model when the variables are categorical. In this study CATREG was used to determine the factors effecting MBA students' success. According to the model, age is the most important variable affecting the success. Age and marital status (1-single, 2-married) are the only two factors have an effect significant on the MBA student's success. Both of the coefficients for these variables are positive in the model. This shows that the success is increasing when the age increases and if the student is married. But in the data set, the ratio of the students who are married and older are very low, therefore this may lead to a positive coefficient.

According to the model, increased attendance rate, higher undergraduate GPA and ALES scores also increases the students' success in their MBA. ALES type (1-verbal, 2 equiponderant, 3- quantitative) also has a positive coefficient. This points that the students who are accepted with their quantitative ALES scores are more successful compared to ALES verbal and equiponderant students. Students who agree on "I can ask the lecturer anything I cannot understand about the course" statement (S1), "Institutes computer laboratory is sufficient" statement (S2) and "Transportation is easy to the Institute" statement (S3) are more successful compared to the students who do not agree on these statements. All these predictors explain the 70.6% of the success of MBA Students. This model could be used to predict MBA Students' success.

In the future, the research could be done with a new and higher sample size. It is also possible to add new variables besides GPA as dependent variable and Nonlinear Canonical Correlation Analysis could be used to measure the model with multiple dependent and multiple independent variables.

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