

COMPARISON BETWEEN MULTIPLE REGRESSION AND
STRUCTURAL EQUATION MODELLING IN
IDENTIFYING INFLUENTIAL FACTORS IN ACADEMIC
PERFORMANCE



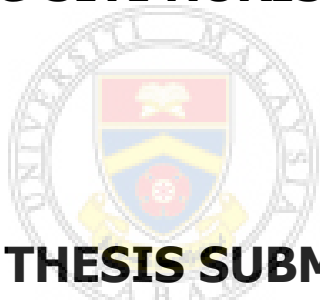
DG SITI NURISYA SAHIRAH BINTI AG ISHA

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UNIVERSITI MALAYSIA SABAH

FACULTY OF SCIENCE AND NATURAL RESOURCES
UNIVERSITI MALAYSIA SABAH
2023

**COMPARISON BETWEEN MULTIPLE
REGRESSION AND STRUCTURAL EQUATION
MODELLING IN IDENTIFYING INFLUENTIAL
FACTORS IN ACADEMIC PERFORMANCE**

DG SITI NURISYA SAHIRAH BINTI AG ISHA



UMS

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THE REQUIREMENTS FOR THE DEGREE OF
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DECLARATION

I hereby declare that the material in this thesis is my own except for quotations, equations, summaries, and references, which have been duly acknowledged.

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A handwritten signature in black ink, appearing to read 'Rahayu', is written over a horizontal line. The signature is positioned to the right of the supervisor's name and below the 'CERTIFIED BY;' text.

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ABSTRACT

Multiple regression (MR) and structural equation modelling (SEM) are statistical techniques frequently used in various fields. Despite the popularity of both methods, limited studies have discussed and highlighted the modelling process of MR and SEM in detail, including their underlying assumptions and procedural steps, as well as comparing the findings for both statistical analyses, especially in the education context. Therefore, this study is conducted to address this gap by presenting a clear and detailed procedure for both MR and SEM. Besides that, this study compares the findings of both methods in identifying the significant factors in students' performance and examining the role of academic motivation as a mediator. A total of 533 undergraduate students from Universiti Malaysia Sabah participated in this study and selected through stratified random sampling. Perception of academic achievement, grade point average (GPA), and cumulative grade point average (CGPA) are used to measure academic achievement. Five factors are included in the model as the independent variables: personal, psychological, demographic, socioeconomic status, and institutional. This study adopted the standard instruments to measure personal, psychological, and institutional factors such as the Big Five Inventory Personality Traits, Rosenberg Self-Esteem, Vallerand Academic Motivation, Schutte Self-Report Emotional Intelligence, Eysenck General Intelligence, and Course Experience Questionnaire. Three types of analyses are employed to identify significant factors: MR, SEM with composite variables (SEM_c), and SEM with measurement indicators (SEM_m). The findings reveal that MR and SEM_c yield similar findings in terms of significant factors identified and values of coefficient of determination (R^2), standardized beta coefficient (β), and standard error. In contrast, SEM_m obtained less significant factors as compared to MR and SEM_c , but the values of coefficient of determination (R^2), standardized beta coefficient (β), and standard error are higher in SEM_m . In conclusion, this study suggests that MR is preferable to SEM in identifying significant factors when using composite variables. However, SEM is superior to MR in assessing mediation effects since it can examine the influence of each variable in the model simultaneously.

Keyword: Multiple regression, structural equation modelling, academic performance, regression coefficient, standard error

ABSTRAK

PERBANDINGAN ANTARA PEMODELAN REGRESI BERGANDA DAN PEMODELAN PERSAMAAN STRUKTUR DALAM MENGENAL PASTI FAKTOR-FAKTOR YANG BERPENGARUH DALAM PRESTASI AKADEMIK

Pemodelan regresi berganda (MR) dan pemodelan persamaan struktur (SEM) ialah teknik pemodelan statistik yang biasa digunakan dalam pelbagai bidang. Walaupun kedua-dua teknik ini selalu digunakan, namun kurang kajian yang membincangkan tentang proses pemodelan MR dan SEM secara terperinci dari segi prosedur pematuan andaian ujian, prosedur pemilihan model serta perbandingan hasil dapatan di antara dua kaedah ini khususnya dalam konteks pendidikan. Oleh itu, kajian ini dijalankan untuk mengatasi kekurangan tersebut dengan mempersembahkan prosedur analisis yang jelas dan teratur dalam penggunaan kedua-dua kaedah. Selain itu, kajian ini juga membandingkan hasil dapatan di antara kedua-dua kaedah tersebut dalam menentukan faktor signifikan yang menyumbang kepada prestasi akademik dan mengkaji peranan motivasi akademik sebagai pengantara. Seramai 533 orang pelajar sarjana muda dari Universiti Malaysia Sabah terlibat dalam kajian ini melalui pensampelan rawak berstrata. Persepsi terhadap pencapaian akademik, purata nilai gred (PNG), dan purata nilai gred kumulatif (PNGK) digunakan bagi mengukur prestasi akademik. Lima faktor yang diambil kira dalam model sebagai pemboleh ubah bebas iaitu faktor peribadi, psikologi, demografi, status sosioekonomi, dan institusi. Kajian ini menggunakan instrumen standard untuk mengukur faktor peribadi, psikologi, dan institusi seperti Big Five Inventory Personality Traits, Rosenberg Self-Esteem, Vallerand Academic Motivation, Schutte Self-Report Emotional Intelligence Test, Eysenck General Intelligence, dan Course Experience Questionnaire. Tiga kaedah iaitu kaedah pemodelan MR, SEM dengan pemboleh ubah komposit (SEM_c), dan SEM dengan item pengukuran (SEM_m) digunakan bagi mengenalpasti faktor yang menyumbang kepada prestasi akademik secara signifikan. Hasil kajian mendapati bahawa pemodelan MR dan SEM_c memberikan hasil dapatan yang sama dari segi faktor yang signifikan dan nilai pekali penentuan (R^2), nilai pekali beta (β), dan nilai ralat. Manakala, SEM_m pula memperolehi kurang faktor yang signifikan berbanding MR dan SEM_c tetapi nilai pekali penentuan (R^2), nilai pekali beta (β), dan nilai ralat yang ditunjukkan oleh SEM_m adalah lebih tinggi. Kesimpulannya, kajian ini menyarankan penggunaan pemodelan MR adalah lebih baik daripada SEM dalam mengenal pasti faktor yang signifikan jika nilai pengukuran komposit digunakan. Namun begitu, dalam menentukan kesan pengantaraan, SEM adalah lebih baik daripada MR kerana ia boleh mengenal pasti pengaruh setiap pemboleh ubah dalam model secara serentak.

Kata Kunci: Regresi berganda, pemodelan persamaan struktur, prestasi akademik, pekali regresi, ralat piawai

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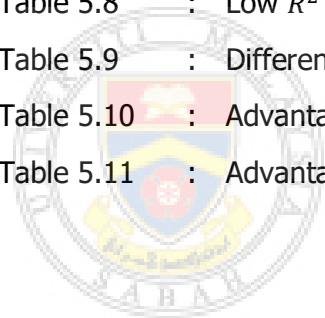
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