Bridging Science and Society: A Compilation of Abstracts in Mathematics, Statistics, and Economics

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SARIMAH SURIANSHAH

PUSAT E-PEMBELAJARAN UNIVERSITI MALAYSIA SABAH
KOTA KINABALU

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PREFACE

The idea for Bridging Science and Society was born out of a simple yet pressing observation: the world's most significant challenges rarely fit neatly within a single discipline. Whether we are examining economic inequality, individual behavioural change, or technological advancement, understanding such issues requires the combined insight of both scientific rigor and social awareness. This compilation seeks to reflect that reality by bringing together sample abstracts from mathematics, statistics, and economics – three fields that, when woven together, offer a powerful lens for exploring complexity, specifically through the journey as Mathematics with Economics Programme's students.

The abstracts included in this volume somewhat were selected to demonstrate how scientific and social perspectives can complement one another in research communication. Each example showcases a distinct way of framing problems, defining objectives, and presenting findings in a clear and concise manner. Beyond serving as writing models, these abstracts reveal how quantitative analysis and theoretical reasoning can jointly contribute to a more holistic understanding of real-world phenomena.

This collection is intended primarily for students, early-career researchers, and educators who wish to improve their ability to conceptualize and summarize research across disciplines. It may also serve as a reference for anyone interested in the language and structure of academic writing that bridges the gap between scientific precision and social relevance. It is our hope that readers will not only find guidance in these examples but also be inspired to pursue their own interdisciplinary inquiries to see, in every problem, the possibility of connection between science and society.

PART I

EDITORIAL NOTE

This inaugural volume of Bridging Science and Society, which serves as a compilation of abstracts from the undergraduate research projects of the Mathematics with Economics Programme, Faculty of Science and Technology, Universiti Malaysia Sabah, marks a significant step forward in celebrating the academic achievements of our students. It is the first time that research abstracts from our final-year projects have been systematically compiled and published, showcasing the intellectual efforts and scholarly contributions of our students across the disciplines of mathematics, statistics, and economics.

A total of 52 abstracts are featured in this volume. Each abstract represents the culmination of rigorous academic work, critical analysis, and supervised research. The abstracts are organized thematically into three categories—mathematics, statistics, and economics- which reflect the distinctive nature of the Mathematics with Economics Programme that bridges the sciences and the social sciences. This publication serves not only as a record of student achievement but also as a resource for future students, educators, and external stakeholders interested in the development of undergraduate research capacity.

On behalf of the editorial team, we extend our sincere appreciation to the students for their hard work and commitment, and to the programme members for their invaluable supervision and editorial contributions. We look forward to producing more publications that continue to showcase the integration between science and social science in the years to come.

Editorial Team

Academic Staff of the Mathematics with Economics Programme
Faculty of Science and Technology
Universiti Malaysia Sabah

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PART I

ACKNOWLEDGEMENT

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Editorial Team

PART I
INTRODUCTION

In today's interconnected world, the boundaries between the natural sciences and the social sciences are increasingly blurred. Complex real-world problems — from economic forecasting and data-driven policy to technological innovation and sustainable development – require insights that draw upon both scientific rigor and social understanding. Recognizing this growing need for interdisciplinary thinking, Bridging Science and Society: A Compilation of Abstracts in Mathematics, Statistics, and Economics brings together examples of academic abstracts that demonstrate how these disciplines intersect in meaningful ways.

This compilation serves as a resource for students, educators, and researchers who seek to understand how scientific reasoning and social inquiry can complement each other in scholarly writing. By showcasing abstracts from mathematics, statistics, and economics, this volume illustrates not only the diversity of topics across these fields but also the shared emphasis on conceptual clarity, methodological precision, and societal relevance.

Each abstract included in this collection reflects a unique approach to problem-solving – whether through mathematical modeling, statistical analysis, or economic interpretation. Together, they provide readers with models for structuring, framing, and articulating research ideas that transcend disciplinary boundaries.

Ultimately, this book aims to inspire a deeper appreciation of how scientific tools can illuminate social realities and how social science perspectives can enrich scientific understanding. It invites readers to see research not as isolated within disciplines but as part of a broader effort to bridge science and society.

PART I

PART 1 MATHEMATICS

Introduction

The Mathematics with Economics Programme is an undergraduate programme offered under the Faculty of Science and Technology (formerly known as the Faculty of Science and Natural Resources). The programme aims to produce graduates equipped with tri-knowledge skills – strong foundations in mathematics, economic reasoning, and analytical thinking. This chapter focuses on the first core area of the programme: Mathematics. It presents a diverse range of undergraduate research projects that reflect both the theoretical depth and practical versatility of mathematical sciences.

The works compiled here demonstrate how mathematical reasoning can be applied to explore abstract theories, develop computational techniques, and interpret patterns in real-world and cultural contexts. The studies are organized into three subtopics: Analytic and Complex Function Theory, Numerical and Computational Methods, and Applied and Cultural Mathematics. By integrating concepts from pure mathematics, numerical analysis, and applied studies, these projects highlight the interdisciplinary nature of the Mathematics with Economics Programme. Each abstract summarizes the objectives, methodology, key findings, and conclusions of the research. Collectively, this section showcases the students' analytical skills, creativity, and ability to employ mathematics as a tool for scientific inquiry and societal understanding. For further reference, hard copies of the respective abstracts are available at the Library of the Faculty of Science and Technology.

Analytic and Complex Function Theory

Analytic and complex function theory is a fundamental branch of mathematical analysis that explores the properties and behaviours of functions defined on the complex plane. This field focuses on functions that are differentiable in the complex sense—known as analytic or holomorphic functions—which exhibit elegant structures and powerful applications across mathematics and engineering. Within this subtopic, the studies investigate various subclasses of analytic and bi-univalent functions, focusing on coefficient estimates, inequalities, and functional relationships involving operators such as the q-exponential and q-Sălăgean differential operators. These investigations contribute to a deeper understanding of geometric function theory, highlighting both theoretical advancements and their potential implications in complex analysis and applied mathematics.

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CHAPTER 1

Coefficient Estimates for Two New Subclasses of Analytic Functions Associated with q-Exponential Function

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Abstract
In the open unit disk given by $\mathbb{D} = \{z : z \in \mathbb{C} \text{ and } |z| < 1\}$, let $\mathcal{N}$ be the class of analytic functions and S be the class of univalent functions. The function is represented by $f(z) = z + \sum_{n=2}^{\infty} a_n z^n$. The purpose of this study is to introduce two new subclasses $\mathcal{X}^*(\mathcal{L}, q)$ and $Y^*(\mathcal{L}, q)$ of analytic functions associated with the q-exponential function. By using Lemma 3.1 and Lemma 3.2, the initial coefficients a_2, a_3, and $|a_3 - a_2^2|$, the upper bound of the Fekete-Szegö functional for functions belongs to the two new subclasses are obtained. This research needs to be studied further, especially the analytic function that subordinates with q-exponential function which is still less explored.

Keywords**:** Analytic functions, Fekete-Szegö functional, q-exponential, q-starlike function, q-convex function

CHAPTER 2

Fekete Szego Problem in the Context of Analytic Functions Associated with q-Salagean Derivative Operator

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Abstract

The Fekete-Szegö problem is a fundamental topic in geometric function theory, particularly for subclasses of analytic univalent functions defined in the open unit disk $\mathbb{U}$. This study introduces a new subclass of analytic functions ($\mathcal{M}_{q,n}(\phi)$) involving the q-Sălăgean derivative operator, a generalization of classical differential operators using q-calculus. The primary objective is to determine the maximum absolute value for the Fekete-Szegö functional $|a_3 - \mu a_2^2|$, where a_n are coefficients of the Taylor series expansion which $f(z) = z + \sum_{n=2}^{\infty} a_n z^n$. By employing subordination theory and key lemmas, coefficient inequalities are derived for the newly introduced subclass. The results demonstrate that the Fekete-Szegö functional $|a_3 - \mu a_2^2|$ for functions belonging to a new subclass are obtained. These findings highlight the significant role of the q-Sălăgean derivative operator in shaping the geometric properties of the newly introduced functions and contribute to a deeper understanding of q-calculus within the framework of geometric function theory.

Keywords: Geometric function theory, Analytic functions, Fekete Szegö functional, q-Sălăgean derivative operator, Maximum absolute value

CHAPTER 3

Fekete-Szegö Results for Subclasses of Analytic Functions of Complex Order Involving q-Sălăgean Differential Operator

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Abstract
This study investigates the Fekete-Szegö problem for new subclasses of analytic functions of complex order $\mathcal{M}_{q,b}(\phi)$ involving Sălăgean q-differential operator. The main objectives include introducing the new subclass of analytic functions, determining the second and third coefficients of the functions in the subclasses and establishing the upper bound of the Fekete-Szegö inequalities within these classes. The approach involves the application of the subordination principle and significant lemmas from previous studies on analytic functions. By applying the significant principle and lemmas, second and third coefficients and upper bound of the Fekete-Szegö inequalities $|a_3 - \mu a_2^2|$ within the new subclass are obtained.

Keywords**:** Fekete-Szegö, Analytic function, Sălăgean q-differential operator, Subordination principle, Complex order

CHAPTER 4

Initial Coefficients and Fekete-Szegö Inequality for A Subclass of Analytic Functions Associated with q-Salagean Differential Operator

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Abstract

This study investigates the Fekete-Szegö inequality within a newly defined subclass of analytic functions, $\mathcal{L}_{q,n}(\phi)$ associated with the q-Sălăgean differential operator. Building upon prior research, this work introduces novel subclasses of q-starlike and q-convex functions, deriving coefficient estimates for the initial coefficients a_2 and a_3. The results extend classical geometric function theory by employing q-calculus to explore the structural and functional properties of these analytic subclasses. The investigation aims to enrich the theoretical framework of the Fekete-Szegö problem while offering insights into the applications of q-calculus in complex analysis. By determining the upper bounds for Fekete-Szegö inequality $|a_3 - \delta a_2^2|$, this study contributes to the broader understanding of the geometric and analytical characteristics of these newly defined subclasses.

Keywords**:** Analytic functions, Fekete-Szegö inequality, q-Sălăgean differential operator

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CHAPTER 5

Fekete-Szegö Results for Analytic Functions Associated with the q-Exponential Function

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Abstract
Let $\mathcal{A}$ denote the class of analytic functions and let S denote the class of univalent functions within the open unit disc $\mathbb{D}$ of the specified form $f(z) = z + \sum_{n=2}^{\infty} a_n z^n$, $(z \in \mathbb{D})$. The primary objective of this study is to present $R(L, q)$, a new subclass of analytic functions that associated with q-exponential function. Moreover, by using some lemma and preliminary results, an upper bound on the Fekete-Szegö functional $|a_3 - a_2^2|$for functions belonging to a new subclass is obtained.

Keywords**:** Analytic functions, Univalent functions, q-exponential function, Fekete-Szegö

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CHAPTER 6

Investigation of Subclasses of Bi-Univalent Functions and Their Initial Coefficients

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Abstract

Let $\mathcal{B}$ denote the class of analytic functions, and Σ denote the class of bi-univalent functions in an open unit disk, $\Omega = (z: z \in \mathbb{C} \text{ and } |z| < 1)$. The function is represented by $f(z) = z + \sum_{n=2}^{\infty} a_n z^n$ and its inverse represented by $f^{-1}(w) = g(w) = w - a_2 w^2 + (2a_2^2 - a_3)w^3 - (5a_2^3 - 5a_2 a_3 + a_4)w^4 + \cdots$. The main objective of this study is to introduce the new subclass $S\mathcal{R}_{\alpha,\Sigma}^{q}(\varphi)$ of bi-univalent functions. By using Lemma 3.1, the initial coefficients of a_2 and a_3 belongs to the new subclass is obtained. This study highlights the significance of the initial coefficients in understanding behavior of bi-univalent functions.

Keywords**:** Analytic functions, Bi-Univalent functions, Initial coefficients, q-Derivative operator

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Numerical and Computational Methods

Numerical and computational methods play a crucial role in bridging theoretical mathematics with real-world problem-solving. This subtopic encompasses techniques used to obtain approximate solutions to complex mathematical problems that are difficult or impossible to solve analytically. The studies presented here involve numerical algorithms and hybrid methods, such as the Laplace Transform–Finite Difference approach, matrix inversion techniques, and efficiency analyses of classical methods for solving differential equations. These works not only demonstrate the versatility of computational mathematics but also underscore its importance in scientific modeling, engineering simulations, and data-driven applications.

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CHAPTER 7

Inverse of n×n Matrix Using Crazy Method

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Abstract
This study introduces a new approach, Crazy Method for finding the inverse of an n×n matrix. The proposed method builds upon LU decomposition but further decomposes matrices into sub-vertical components before inverting them individually and reassembling the final inverse. By systematically handling submatrices, this approach aims to enhance computational efficiency, reduce redundancy, and optimize the inversion process, particularly for large matrices. This research explores the theoretical foundation of the Crazy Method, compares its computational complexity with existing inversion techniques, and demonstrates its applicability through numerical examples. The methodology is validated by evaluating the determinant of the matrix, ensuring invertibility, and verifying results against standard inversion algorithms. Furthermore, challenges such as row swapping and computational overhead are discussed, along with potential optimizations for practical implementation. The result and discussion discover that although the Crazy Method is a more structure-oriented and alternative method for inverse, it cannot be solved if |A|=0 which is indicative of its limitation and the future refinement.

Keywords**:** Matrix inversion, L U decomposition, Crazy method, High-order matrix

CHAPTER 8

Laplace-Finite Difference Method for Solving One Dimensional Diffusion Equations

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Abstract
This study discusses on how to apply the direct method to solve a system of linear equations generated in various stages, especially 5, 6, and 7. Next, a comparison was made on the exact solution value and the approximate solution to determine the accuracy of the method used. Considering the effectiveness of the Laplace-finite difference method in terms of accuracy, the maximum absolute error assessment and two example problems for one-dimensional diffusion equations were considered. Based on numerical experiments, the comparison results show that the Laplace-finite difference method has an accuracy that is almost the same as the traditional numerical method. As a result, the Laplace-finite difference method is believed to be an alternative numerical method in solving one-dimensional diffusion equation problems.

Keywords**:** Laplace-finite difference method, Direct method, One dimensional diffusion equation, Numerical accuracy, Maximum absolute error

CHAPTER 9

Laplace Transform-Finite Difference Method in Solving Hyperbolic Second Derivative 1D

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Abstract
This study discusses the Laplace Transform-Finite Difference (LTFD) method as a new approach to solve second order one-dimensional hyperbolic problems, specifically the wave equations. The objectives of this study are to derive the corresponding second-order ordinary differential equation using the Laplace transform, formulate the LTFD approximation equation for generating a system of linear equations and evaluate the accuracy of the approximate solution obtained through this method. This study employs a combination of the Laplace transform for the time dimension and the finite difference method for spatial discretization, resulting in an approximate solution in matrix form to facilitate numerical computation. Simulations were conducted in Mathcad 15 on three different problems with varying initial and boundary conditions to assess the effectiveness of this method. The findings indicate that the LTFD method provides accurate and efficient solutions, with improved precision as the order of the coefficient matrix increases. Furthermore, a comparison between the exact and approximate solutions demonstrates that this method not only reduces computational errors but also yields stable results even for larger parameter values.

Keywords**:** Laplace transform, Finite difference, Mathcad-15, Numerical method, Second order

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CHAPTER 10

Evaluating Computational Efficiency of Newton-Aitken and Newton-Lagrange Methods for Solving First-Order Ordinary Differential Equations

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Abstract
This study compared the computational efficiency of the combined Newton-Aitken method and the combined Newton-Lagrange method in solving first-order differential equations (ODE). This research focuses on comparing the performance if this numerical interpolation method in terms of efficiency, accuracy, and cost of calculation. Both methods were used on linear and non-linear ODE ranges in each problem studied. For linear ODE, the analysis is extended to cubic equations. The results show that the Newton-Aitken method is more efficient due to its higher calculation accuracy with smaller absolute error values and lower computational complexity, making it suitable for real-time applications in various fields. Although the Newton-Lagrange method provides higher accuracy, the increased cost of calculations makes it less practical in some problem cases. The results show that the Newton-Aitken method as a reliable and efficient method compared to the Newton- Lagrange method in solving ODE in various scientific and engineering applications.

Keywords**:** ODE, Newton-Aitken, Newton-Langrange, Interpolation, Computational Efficiency

Applied and Ethnomathematics

Applied and cultural mathematics integrates mathematical concepts with real-world phenomena, connecting abstract theories to tangible contexts such as physics, economics, and cultural heritage. The studies under this theme demonstrate how mathematical principles underpin practical systems – from modeling wave equations in physical vibrations to applying arithmetic progressions in business economics. Additionally, the exploration of ethnomathematics highlights the presence of mathematical patterns in traditional art and cultural designs, such as those found in Wau motifs. Collectively, these works exemplify how mathematics transcends the boundaries of science, reflecting its universal role in understanding both natural and cultural systems.

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CHAPTER 11

Method of Arithmetic Progression in Business Economics

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Abstract
The purpose of this research is to investigate how mathematical sequences are used in business economics, with a particular emphasis on utility theory, cost analysis, and revenue analysis. The study uses a quantitative technique to calculate marginal revenue and total revenue as well as to examine the relationship between increases in production units and total costs, average costs, and marginal costs. The results show a direct correlation between average cost and marginal cost as well as a rise in total revenue that matches marginal revenue. In order to improve profitability and cost effectiveness, the conversation explores the mathematical implications of arithmetic sequences in commercial decision-making processes. In summary, firms can maximise utility within budgetary limits by using mathematical sequences, which supports more efficient economic planning.

Keywords**:** Aritmetic progression, Business economic, Total cost, Average cost, Marginal cost

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CHAPTER 12

Ethnomathematics on Motif Wau

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Abstract
This study utilizes the concept of ethnomathematics to demonstrate that traditional games and crafts, such as the motifs designed on traditional wau in Malaysia, are closely related to basic mathematical principles. The aim of this research is to enhance public understanding and awareness, particularly among younger generations, regarding the application of mathematical concepts in daily life, especially in promoting the uniqueness, beauty, and significance of cultural heritage. The methodology employed in this study involves direct observation of wau images obtained from various websites, including the official website of the Wau Museum in Kelantan. The research focuses on seven types of wau, namely Wau Bulan, Wau Kucing, Wau Jala Budi, Wau Daun, Wau Merak, Wau Seri Bulan, and Wau Dodo Helang. The formation of the motifs on these wau was analyzed using elements of geometry and symmetry. The results reveal that the application of mathematical concepts is crucial in preserving the beauty, balance, and appeal of wau motifs.

Keywords**:** Ethnomathematics, Geometry, Symmetry, Wau motif, Malay culture

CHAPTER 13

Wave Equation in String Vibration

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Abstract
This study examines the wave equation in string vibration, focusing on its mathematical derivation, solution methods, and applications in acoustics and musical instruments. The research begins with an exploration of the historical link between mathematics and music, highlighting the contributions of Pythagoras, Fourier, Bernoulli, and d'Alembert in understanding wave motion. The wave equation is derived using Newton's second law of motion and force equilibrium principles, providing a fundamental mathematical model to describe vibrating strings. The study applies the method of separation of variables to obtain analytical solutions, incorporating boundary conditions and initial conditions to explore wave propagation, standing waves, and harmonic frequencies, which are fundamental in sound production. Fourier series analysis is used to decompose complex waveforms into their fundamental components, offering deeper insights into periodic vibrations. The results show that the mathematical modelling of wave equation accurately describes string vibrations, providing insights into musical acoustics, engineering, and physics. Harmonic analysis reveals how string tension, length, and mass density influence sound production in stringed instruments.

Keywords**:** Wave equation, String vibration, Mathematical modelling, Fourier series, Musical acoustics

PART II
PART 2 STATISTICS

Introduction

The Mathematics with Economics Programme, offered under the Faculty of Science and Technology (formerly known as the Faculty of Science and Natural Resources), provides students with comprehensive training that integrates mathematical, statistical, and economic knowledge. This chapter focuses on the second core area of the programme: Statistics. It features a collection of undergraduate research projects that illustrate the practical and theoretical applications of statistical methods in understanding real-world phenomena.

Statistics, as the science of data, involves collecting, organizing, analyzing, and interpreting information to test hypotheses and support decision-making across various domains. The studies compiled here demonstrate the versatility of statistical techniques in exploring issues related to education, human development, environment, and finance. By employing tools such as regression analysis, factor analysis, clustering, probability distributions, and time-series modeling, these projects uncover meaningful insights into human behaviour, natural patterns, and economic trends. Collectively, they highlight how statistical reasoning supports evidence-based inquiry while fostering critical thinking, problem-solving, and innovation among students. For further reference, hard copies of the respective abstracts are available at the Library of the Faculty of Science and Technology.

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Applied Statistics, Modeling, and Regression Analysis

Applied statistics and regression modeling form the foundation of quantitative inquiry across disciplines, enabling researchers to uncover meaningful patterns, relationships, and predictive insights from data. In the context of education and human development, these methods provide powerful tools for understanding how factors such as training, learning habits, health, and lifestyle influence academic performance and employability. At the same time, regression and statistical modeling techniques, ranging from linear and logistic regression to time-series analysis- extend these applications to broader economic and social contexts, supporting data-driven decisions in areas such as productivity, financial forecasting, and workforce development.

The studies compiled under this theme employ diverse statistical approaches, including cluster analysis, factor analysis, and multiple regression techniques, to analyze complex datasets and interpret human and institutional behaviour. Collectively, these works highlight the versatility of statistical methods in bridging theory and practice, demonstrating how quantitative analysis can inform educational improvement, social understanding, and strategic decision-making in an increasingly data-driven world.

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CHAPTER 14

The Relationship Between Training, Role Suitability, Efficiency and Effectiveness on Student Performance in PALAPES

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Abstract
This study examines the relationship between training, role suitability, efficiency and effectiveness on the performance of PALAPES students at Universiti Malaysia Sabah (UMS). The focus of the study is to identify factors influencing student performance, analyze the relationships of independent variables (Training, Role fit, Effectiveness, Efficiency) on performance, and determine significant effects through multiple linear regression analysis. This research adopts a quantitative approach, with data collected via questionnaires involving 76 PALAPES students. The data were analyzed using SPSS software, employing descriptive statistics and regression model development. The findings indicate that well-structured training, appropriate role suitability efficiency and effectiveness positively impact students' performance.

Keywords**:** Performance, Training, Role Suitability, Efficiency, Effectiveness

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CHAPTER 15

A Comparison of Gender and Field of Studies Towards Challenges and Online Learning Strategies Among Universiti Malaysia Sabah Students

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Abstract
Online learning has become the new norm in higher education since the COVID-19 pandemic. This study aims to identify the factors of challenges and strategies in online learning, as well as to compare means based on gender, faculty, total family income, and study focus time among undergraduate students at Universiti Malaysia Sabah. The quantitative study involved 409 respondents, using an online questionnaire analyzed through factor analysis, independent t-test, Mann-Whitney U test, ANOVA, and Kruskal Wallis test. Six main factors were identified, including socioeconomic, psychological and physical, physical health, social, infrastructure and technology, and time management. The results showed significant differences in physical health factors between genders, time management based on faculty, and psychological and physical factors based on faculty and family income, with students from low-income categories facing greater challenges. These findings provide insights into the need to improve time management, support student health, and develop more inclusive and responsive online learning policies for students from diverse backgrounds.

Keywords**:** Online learning, Challenges, Strategies, Universiti Malaysia Sabah

CHAPTER 16

Analysis of Exercise, Diet and Gender Among University Students on Academic Performance: A Case Study in Universiti Malaysia Sabah

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Abstract
This study investigates the impact of exercise, dietary habits, and gender on the academic performance of undergraduate students at Universiti Malaysia Sabah. Data collected using descriptive and factor analysis, and statistical tests, i.e. Mann-Whitney U test and Kruskal-Wallis test using sample of 403 students. It is found that exercise frequency, dietary patterns and gender are all associated with academic achievement. Female students preferred exercise routines with moderate physical activities and with balanced diets meanwhile male students favoured exercise routines with intensive physical activities and protein rich diets. Further, a healthy lifestyle that is combined by exercise and diet, not only has an effect on the improved academic success but also on the cognitive enhancement. The results, despite weaknesses in the study (limited to self-reported data and a cross-sectional study design), suggest that there are consequences to lifestyle activities related to underperformance in academics. Further research in this topic should include longitudinal studies and should broaden the view of these relationships by analyzing socio economic status and mental health variables. The results are useful both for the current debate about student well-being, and have immediate practical applications for educators, policy makers, and clinicians in the health field.

Keywords**:** Academic performance, Exercise, Diet, Gender differences, Cognitive function

CHAPTER 17

Exploring Study Habits and Academic Performance: A Cluster Analysis of Undergraduate Students' Learning Strategies

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Abstract

This research examines the relationships between undergraduate students' learning strategies and study habits as well as academic achievement by utilizing cluster analysis techniques. Two clustering analysis methods, which are Agglomerative hierarchical and K-means clustering were employed to explore student separations through self-reported learning methods combined with academic achievements. The study involved 277 students from Universiti Malaysia Sabah with data collected on time management, study conditions and motivation. The analysis identified two distinct clusters of students based on their combined findings: Cluster 1, defined by organized study practices and higher academic achievement 1 with an average CGPA score of 3.57 while Cluster 2 distinguished by strong intrinsic motivation but with lower academic performance, with an average CGPA of 2.06. Hierarchical clustering demonstrated higher compactness, as indicated by a Silhouette Coefficient of 0.5323, while K-means clustering had better cluster separation with a Calinski-Harabasz Index of 441.11. ANOVA results confirmed a significant difference exists between cluster assignment and CGPA scores since students' study practices influence their academic performance. These outcomes require individualized teaching methods that match students' unique learning traits per the research findings.

Keywords**:** Study habits, Learning strategies, Academic performance, Cluster analysis, Undergraduate students

CHAPTER 18

Analysis of Internet Use, Sleep and Studying on Students' Academic Performance

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Abstract

This study concerns the academic performance of Universiti Malaysia Sabah students. The objectives of the study are to compare the mean of factors influencing students' academic performance based on sociodemographic factors such as gender, year of study, and household income, as well as to model the factors affecting students' academic performance using regression model. A sample of students was collected from all faculties at the Kota Kinabalu Campus through the distribution of online questionnaires (Google Form). The questionnaire consisted of three sections covering sociodemographic information, internet usage, students' sleeping pattern and study hour. A total of 334 students participated in this study. The analyses used to achieve the first objective were non-parametric tests, including Mann-Whitney test and Kruskal-Wallis test, while the second objective was analyzed using multiple linear regression (MLR). Additional analyses such as normality test, ANOVA and goodness of fit test were also conducted to support obtaining more robust analytical results. The results of the analysis on differences in the mean of sociodemographic factors, showed that the year of study had a significant difference. This indicates that academic performance of students varies across different years of study. In the MLR analysis, four independent variables were considered: average time spent on the internet for academic purposes, average time spent on the internet for non-academic purposes, average sleep time and average study time. Among these variables, the average time spent on the internet for non-academic purposes (β=-0.58, $p<0.05$) and average time spent studying (β=0.070, $p<0.05$) significantly influenced students' academic performance. The results showed a negative relationship between students' academic performance and the average time spent on the internet for non-academic purposes. In conclusion, this study provides valuable insights for UMS students on managing their time wisely to improve their academic performance.

Keywords**:** CGPA, Multiple linear regression, Gender, Year of study, Household income

CHAPTER 19

The Effectiveness of Training on the Efficiency and Productivity Among SUKSIS Students

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Abstract
This study aims to evaluate the effectiveness of training on the efficiency and productivity of Siswa Siswi Kor Sukarelawan Polis (SUKSIS) students at Universiti Malaysia Sabah (UMS), focusing on the factors influencing the effectiveness of the training. The study has used a quantitative approach, where data is collected through questionnaires and analyzed using multiple regression analysis. The results indicate that the structured training has a significant positive impact on enhancing students' efficiency in performing safety and community service tasks. Students who receive quality training show improvements in technical skills, self-confidence, and their ability to carry out tasks more efficiently and productively. The effectiveness of the training is influenced by factors such as the method of delivery, management support, and the alignment of content with task requirements. The study concludes that effective training not only improves individual efficiency but also contributes to achieving the strategic goals of the SUKSIS program as a whole. Recommendations for future research include improving post-training performance monitoring and enhancing technical support to ensure training remains relevant and continues to have a positive impact on students.

Keywords**:** Training, Efficiency, Effectiveness, SUKSIS, Productivity

CHAPTER 20

Factor Affecting the Graduate Employability by Using Logistic Regression Analysis

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Abstract
Graduate employability is a significant concern for academic institutions and policymakers aiming to prepare students for dynamic and competitive labor markets. This study investigates the factors influencing employability among Universiti Malaysia Sabah graduates, employing a combination of statistical methods, including Chi-Square tests, Mann-Whitney U test and the logistic regression analysis, to analyze the impact of variables such as CGPA (Cumulative Grade Point Average), gender, MUET (Malaysian University English Test) rankings, and certificate for admission to UMS. The dataset comprises responses from 347 graduates collected through the Graduate Tracer Study, providing a comprehensive view of demographic and academic factors affecting employment outcomes. The Mann-Whitney U test was used to compare differences in employability outcomes across non-normally distributed variables, while Chi-Square tests assessed the independence of categorical variables. Logistic regression modelling further quantified the relationships between key predictors and employment likelihood. The results highlight a graduate employability rate of 22.5%, with CGPA emerging as the most significant predictor, while other variables demonstrated limited statistical influence. This study offers a validated statistical framework for understanding graduate employability and guiding targeted interventions.

Keywords**:** Graduate employability, Demographic, Academic factor, Chi-square test, Logistic regression

CHAPTER 21

A Study About the Social Media's Factors Affecting Mental Health: Factor Analysis

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Abstract

Social media has been putting an impactful impression towards human mental health nowadays. The excessive usage of social media can be either an advantage or a disadvantage for certain people towards their mental health conditions. There are two objectives of this study is to identify the potential factors of the social media use affecting mental health among university students in Malaysia and to determine the mean differences between the effects that are obtained with demographic factors. The questionnaire consists of two sections: Section A (Demographics) and Section B (Perception of the Social media use and Mental Health). A total of 300 respondents participate in taking part on this study. Factor analysis was used to carry out the findings of objective 1, and mean differences of parametric and non-parametric test were applied in objective 2. The mean rank of factors obtained with gender will be analyzed using the independent T-test and Mann Whitney U test. As for Analysis of Variance (ANOVA) and Kruskall Wallis test will be used to analyze the mean rank between the factors with the other demographic factors. The results from objective 1 identified five factors: negative self-perception and mental health, social connection and isolation, social media addiction and behavioral patterns, social comparison and inferiority complex, and cyberbullying and online harassment experiences. In objective 2, the analysis of mean rank differences revealed that most factors did not show significant differences with demographic variables (gender, age, attended university, year of study, and parents' education level). However, exceptions were found for negative self-perception and mental health with respondents' age and year of study, social comparison and inferiority complex with respondents' attended university and year of study, and social media addiction and behavioral patterns, as well as cyberbullying and online harassment experiences, with respondents' parents' education level

Keywords**:** Factor Analysis, Demographic Factor, Independent T-test, ANOVA, Mann Whitney U Test

CHAPTER 22

Analysis of Factors Influencing Student Interest and Awareness in Stem Field: A Study on Science and Mathematics Subjects

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Abstract
This study was conducted to examine the factors influencing students' interest and awareness towards Science and Mathematics subjects, as well as to investigate differences in these factors based on demographic variables. The sample comprised 163 secondary school students in Tawau, Sabah, who were enrolled in Science and Mathematics subjects. Data collection was carried out through the distribution of questionnaires to students in several secondary schools in Tawau, Sabah. Data analysis was performed using the Statistical Package for Social Sciences (SPSS) software, employing several tests, including reliability tests, descriptive analysis, factor analysis, normality tests, Mann-Whitney tests, Kruskal-Wallis tests, independent sample t-tests, and analysis of variance (ANOVA). The findings identified six key factors influencing students' interest and awareness towards Science and Mathematics: self-motivation, with a variance percentage of 29.57%, followed by interest in furthering studies in Mathematics (9.64%), active class participation (7.74%), self-directed learning (6.82%), interest in furthering studies in Science (5.88%), and personal attitude (5.70%). The analysis also revealed significant differences based on gender, ethnicity, and subject preferences for the factors of self-motivation and personal attitude. Conversely, residential location and parents' employment status showed no significant impact. This study highlights the crucial role of demographic factors in shaping students' interest in STEM education

Keywords**:** Student interest, Awareness, STEM education, Demographic factors, Science and Mathematics

CHAPTER 23

Unravelling the Factors of Stress Among Undergraduate Students in Universiti Malaysia Sabah (UMS): A Case Study Using Factor Analysis

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Abstract
Stress is common among university students across the world, and the frequency looks to be rising. The objectives of this study are to identify factors that affect stress among undergraduate students at Universiti Malaysia Sabah (UMS) and to study the mean difference between the factors that influence stress with demographic factors. Data were collected through an online survey comprising two sections: Section A, which focused on demographic information, and Section B, which included 28 items assessing stress factors among university students. There were responses from 320 undergraduate students at UMS. Several statistical methods were employed, including descriptive statistics, factor analysis, Man-Whitney U-test and Kruskal-Wallis test. There were five identified factors namely, interpersonal and social factors, academic workload, physical and emotional factors, time and performance pressure and financial-related factors. The result for the mean difference will involve identifying significant differences in stress among undergraduate students at UMS based on demographic characteristics. The findings showed no significant differences in mean ranks between male and female students across all five identified factors, while significant differences were observed across demographic factors such as faculty, year of study, CGPA, place of residence, employment status, and family income. This analysis aims to determine if specific demographic groups experience higher or lower stress levels, providing insights into targeted stress management strategies.

Keywords: Stress, Factor analysis, Demographic factors, Mann-Whitney U, Kruskal-Wallis test

CHAPTER 24

Analysis of Student Healthy Lifestyle Affecting Their Academic Performance

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Abstract
Healthy lifestyle among students is important as it is affecting their academic performance. The objectives of this study are to identify factors that influence the academic performance of university students and to determine the mean comparison between demographic factors and factors that influence the academic performance of university students. A total of 374 students from various faculty were randomly selected to participate in this study. Data were collected through a questionnaire that covered aspects of nutrition, physical activity, sleep quality and stress management. Factor analysis was conducted to identify the main dimensions of a healthy lifestyle that affect academic performance. This indicates the factors, which were sleep quality, exercise routine, eating pattern, academic stress and health problem. Based on the results of the analysis of the study, it was found that students who have a healthy eating style, often do physical activity in a week (30 minutes or more in a day), and have an ideal quality of sleep tend to have better academic performance than students who always neglect their health. With that, this healthy lifestyle practice should be emphasized in students so that they can manage themselves better in pursuit of academic success without neglecting physical and mental health.

Keywords**:** Healthy lifestyle, Academic performance, Factor analysis

CHAPTER 25

Online Vs. Face-To-Face Mathematics Learning: A PLS-SEM Analysis of Academic Motivation and Learning Outcomes

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Abstract
This research seeks to identify the optimal learning modality—online or in-person—for mathematics education at Universiti Malaysia Sabah (UMS), emphasising academic motivation and learning outcomes. A quantitative research methodology was utilised, employing a standardised questionnaire to gather data from UMS students across all faculties. The research encompassed a sample of 144 undergraduate students from the first to fourth year, chosen via convenience sampling to guarantee extensive representation. Partial Least Squares Structural Equation Modelling (PLS-SEM) was employed to examine the interrelations among learning mode, academic motivation, mathematics anxiety, and learning outcomes. The results indicate that in-person learning improves academic motivation and performance through rapid feedback and peer interaction, while online learning offers increased flexibility but poses difficulties in sustaining engagement and alleviating mathematics fear. Demographic characteristics, including age, gender, and geographic origin, were identified as influencing learning preferences and outcomes. The research emphasises the advantages of a hybrid learning paradigm that integrates online and face-to-face components to enhance student learning experiences.

Keywords**:** Online learning, Face-to-face learning, Mathematics education, Academic motivation, PLS-SEM

CHAPTER 26

Identifying Determinants of Academic Performance Among Mathematics with Economics Students in Universiti Malaysia Sabah Using Multiple Linear Regression Analysis

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Abstract
This study examines the factors influencing the academic performance, measured by Cumulative Grade Point Average (CGPA) among Year 2, 3, and 4 Mathematics with Economics students at Universiti Malaysia Sabah (UMS). The research specifically aims to examine the relationships between three key factors — student's effort, time management, and lecturers' factor — and their impact on CGPA. Additionally, it seeks to identify the most significant predictor of academic performance and investigate students' perceptions of these factors. A quantitative research approach was adopted, utilizing a structured questionnaire to collect data, which was subsequently analyzed through descriptive statistics, correlation analysis, and multiple linear regression. The findings revealed that among the three factors studied, student's effort emerged as the sole significant predictor of academic performance, whereas time management and lecturers' influence showed no statistically significant relationship with CGPA. Interestingly, despite the statistical analysis indicating that student's effort is the only significant factor, students perceive lecturers' support as the most crucial element for their success, underscoring a notable gap between perception and reality. These results highlight the pivotal role of self-motivation and active engagement in determining academic outcomes. Therefore, the study suggests that initiatives aimed at enhancing academic performance should prioritize strategies that foster students' intrinsic motivation and independent study habits, rather than relying solely on external support systems. Ultimately, this research contributes to a better understanding of the academic dynamics within the Mathematics with Economics program at UMS and offers valuable insights for educators and policymakers in designing targeted interventions to support student success.

Keywords**:** Academic performance, Student's effort, Time management, Lecturers' factor, Multiple linear regression analysis

Probability Distributions and Environmental Modelling

Probability distributions and environmental modelling are essential areas in statistics that focus on understanding the variability and uncertainty inherent in natural and socio-economic phenomena. The studies in this subtopic utilize theoretical distributions such as the Lognormal and Generalized Extreme Value (GEV) distributions to analyze rainfall data, model extreme weather events, and describe income distribution patterns. By applying statistical theory to real-world data, these works demonstrate how probabilistic models can inform risk assessment, resource management, and policy development, particularly in environmental and social planning.

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CHAPTER 27

Modelling of Maximum Rainfall Using Generalized Extreme Value Distribution

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Abstract
Maximum rainfall refers to the highest recorded rainfall intensity over a specific period at a given location. It is a crucial factor in hydrological studies and disaster risk management for floods and landslides. This study aims to utilize the Generalized Extreme Value (GEV) distribution to model maximum rainfall data in Ranau, Sabah. The study applies the Generalized Extreme Value (GEV) Distribution as a fitting model, and the maximum likelihood estimation (MLE) is used as the parameter estimation method. The results indicate that the GEV distribution is appropriate as the estimated parameters produce a negative Weibull-type distribution. The analysis is based on a sample of 33 years of annual maximum rainfall data collected from 1985 to 2017. The range of annual maximum rainfall data examined is between 56.7 mm and 166 mm, indicating significant variation in the recorded maximum rainfall over the study period. The goodness of fit (GOF) of the model is evaluated using a P-P plot with a 95% tolerance interval. The results show that the GEV distribution is suitable for modeling the annual maximum rainfall distribution in Ranau, Sabah. Thus, the GEV model has predicted return levels of maximum values for 5, 10, 25, 50, and 100 years. The results show that the predicted maximum values are 117.38 mm, 133.62 mm, 154.08 mm, 169.19 mm, and 184.15 mm, respectively.

Keywords**:** Generalized Extreme Value Distribution (GEV), Maximum Likelihood Estimation (MLE), Maximum Rainfall, Goodness of Fit (GOF) test

CHAPTER 28

Lognormal Distribution for Modelling Household Income Distribution in Selangor

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Abstract
This study investigates household income distribution in Selangor, using 2019 data from the Department of Statistics Malaysia (DOSM). The main objectives of this study are to fit the lognormal distribution to model household income distribution in Selangor. The parameters are estimated using the maximum likelihood estimation (MLE). The goodness of fit (GOF) was evaluated using 95% and 99% tolerance interval. The model has fitted and assured the Q-Q plot with 95% and 99% tolerance interval. As a result, the parameter estimates for the lognormal distribution are $\mu = 8.9827$ and $\sigma = 0.6664$. The study's findings indicate that the lognormal distribution to the data is a good fit based on the 99% tolerance interval and a suitable model to model the household income data of Selangor. Income distribution like lognormal is closely linked to income inequality, as it provides insight into the disparities in income levels across different segments of the population.

Keywords**:** Income Distribution, Lognormal Distribution Model, Maximum Likelihood Estimation (MLE), Goodness of Fit (GOF) using Q-Q Plot with 99% tolerance interval

CHAPTER 29

Modelling of Generalize Extreme Value (GEV) Distribution Maximum Rainfall Data in Pitas, Sabah

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Abstract
The generalized extreme value (GEV) distribution is a powerful tool for modeling extreme events, such as maximum rainfall, which are critical in hydrological studies and risk assessment. This study aims to model the maximum annual rainfall data in Pitas, Sabah, using the GEV distribution and to forecast future return levels of extreme rainfall events. Secondary data consisting of maximum annual rainfall records over a 33-year period from 1985 to 2017 were obtained from the Sabah Hydrology Department. The parameters of the GEV distribution were estimated using the maximum likelihood estimation method (MLE), which yielded a Weibull-type distribution with negative shape parameter value. Goodness-of-fit (GoF) testing was conducted using Q-Q plots, and the data points were observed to closely align with the 45° reference line, indicating that the observations are consistent with the model. A 95% tolerance interval produced a range for the data points, demonstrating that the data fall within the specified rejection region of 5%. The results indicate that the GEV distribution can be appropriately fitted to the maximum rainfall data by using the parameter estimated, (μ, σ, ξ) = (1521.099, 64.36, -0.68). The estimated return levels suggest that extreme rainfall events are likely to exceed the current maximum value by approximately 242.5851 within the next 100 years. In conclusion, modeling maximum rainfall using the GEV distribution provides valuable insights into future extreme events, emphasizing the necessity for proactive measures to mitigate potential adverse impacts on the community and environment.

Keywords**:** Generalized extreme value distribution, Extreme rainfall, Stationary, Goodness of fitness test, Weibull distribution

Statistical Applications in Economics and Finance

Statistics plays a critical role in understanding economic behaviour in a rapidly evolving global market as well as analyzing financial data. The studies under this subtopic particularly employ statistical techniques to examine the dynamics of investment assets, inflation hedging properties, and the influence of digital platforms on investment preferences among young adults. By integrating statistical analysis with financial and economic theory, these works offer valuable insights into market behaviour and investment decision-making. Collectively, they highlight how data-driven approaches can support the development of informed strategies in finance, contributing to a more resilient and adaptive economic landscape.

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CHAPTER 30

Analyzing Real Estate, Gold, and Cryptocurrency as Inflation Hedging Properties in Malaysia

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Abstract
This study analyzed the inflation-hedging capabilities of real estate, gold, and cryptocurrency within Malaysia's economic context. The objectives were assessing their historical performance through descriptive analysis, determining their relationship with inflation indicators (CPI and PPI) using correlation analysis, and modeling these relationships using regression analysis. The study utilized monthly data spanning from 2010 until 2024 for real estate and Kijang Emas for gold, and 2013 to 2024 monthly data for cryptocurrency (Bitcoin) data covers the period from 2013 to 2024. Results show that gold exhibits the strongest inflation-hedging capability with high positive correlations to CPI (0.888) and PPI (0.384) and an R-squared value of 82.13%, followed by real estate with stable returns, a negative correlation to inflation, and an R-squared value of 40.83%. Conversely, cryptocurrency shows weak inflation-hedging potential, with minimal correlation to inflation indicators and an R-squared value of 0.0045, reflecting its speculative nature. The study concludes that gold is the most reliable hedge against inflation in Malaysia, real estate provides moderation protection, and cryptocurrency is unsuitable for this purpose.

Keywords**:** Inflation-Hedging, Descriptive, Correlation, Regression

CHAPTER 31

Time-Series Regression Analysis of Capital Market and Economic Growth: Case Study of Malaysia

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Abstract
This study investigates the relationship between capital market and economic growth in Malaysia. The study employed a time series analysis of annual data spanning from 1981 to 2022. The dependent variables of economic growth were expressed by Gross Domestic Product (GDP) while the independent variables are the capital market indicators expressed by market capitalization (MCAP), total value of stock (TVS), and foreign direct investment (FDI). This time series regression analysis involves further estimation of the Multiple Linear Regression (MLR) model using Ordinary Least Square (OLS) method. The regression estimates indicates that the capital market indicators have a positive and significant effect on Malaysian economic growth. There are three stages of method which are unit root test using Augmented Dickey-Fuller (ADF) test, Phillips-Perron (PP) test, and Kwiatkowski–Phillips–Schmidt–Shin (KPSS) Test, Johansen cointegration test using trace test and maximum eigenvalue test, and lastly Granger causality test. From the unit root test, the findings indicate that all the time series data are stationary at first difference level I (1). Johansen cointegration test reveals that there is a long-run relationship between the variables. Further results from Granger causality test indicate there is a unidirectional causal relationship running from MCAP to GDP, FDI to GDP and TVS. There is a two-way causal relationship between GDP and TVS, and MCAP and TVS. However, there is no causal relationship between FDI and MCAP. This study underscores the greater impact of stock market indicators compared to financial development indicators, advocating for government measures to strengthen market confidence, encourage foreign investment, diversify financial instruments, and uphold economic stability to foster growth and technological progress.

Keywords**:** Capital market, Economic growth, Multiple Linear Regression (MLR), Johansen cointegration, Granger causality

CHAPTER 32

Forecasting Gold Prices Using Multiple Linear Regression Method

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Abstract
This study develops a forecasting model for gold prices using the Multiple Linear Regression (MLR) method, focusing on the influence of exchange rates, oil prices, the US Dollar Index, and inflation rates. The objective is to analyze the relationships between these economic indicators and gold prices and construct a robust predictive model. The methodology involves collecting secondary data from 2014 to 2024 and performing statistical analysis using SPSS version 29 to build and validate the MLR model. Descriptive statistics and diagnostic checks, including multicollinearity, normality, and homoscedasticity tests, ensure model reliability. The results indicate that the exchange rate and the US Dollar Index significantly impact gold prices, while oil prices and inflation rates have a comparatively lesser effect. The model demonstrates moderate predictive accuracy, with a moderate strong coefficient of determination (R^2) of 0.484, confirming its effectiveness in forecasting. A comparative analysis between predicted and actual gold prices further supports the model's reliability. However, external factors such as geopolitical instability and market sentiment introduce uncertainties beyond the model's scope. This study provides valuable insights for investors, financial institutions, and policymakers, helping optimize investment decisions and risk management strategies. While the model proves effective, limitations such as data assumptions, variable selection, and evolving economic conditions warrant further refinement. Future research could incorporate machine learning techniques to enhance accuracy. The findings contribute to the financial forecasting field, offering a practical tool for understanding and predicting gold price movements in dynamic economic environments.

Keywords**:** Gold price forecasting, Multiple linear regression (MLR), Exchange rate, US Dollar Index, Economic indicators

CHAPTER 33

The Impact of Digital Platforms on Young People Preferences in Unit Trusts and Stock Markets

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Abstract
The purpose of this research study is to determine the impact of digital investment platform on young people preferences. Rapid developments in technologies have given births to many digital investment platforms for financial institution including investment. Even though investment is one of the features that currently exist for digital platform, majority of younger people still has low knowledge and intention to adopt the technologies. The objective of the study is to determine the financial literacy level of younger generation while assessing the intention to adopt the digital investment platform and its impact to their preferences in unit trusts and stock markets. The primary data was collected through the help of structured survey questionnaire adapted from past study. The online survey was distributed among 673 Malaysian young people. The financial literacy of respondents was measured through score of the financial literacy test. The binary logistic regression model has been made to assess the young people intention to adopt digital investment. While multinomial logistic regression was used to identify the impact of digital innovation on young people preferences. The results indicate that young people have fairly good financial knowledge with the mean score of 66.66%. However, 53.8% respondents chose not to adopt the digital investment platforms, though the minority intends to do so. Among those who have adopted, 55.6% respondents choose not to invest in neither the unit trust and stock markets or one of the options. In conclusion, the study able to determine the financial literacy level of young people while assessing the intention to adopt the digital platforms, but the study fails to determine the preferences as there is limited impact of the digital investment platforms on young people's preferences as majority chose not to invest.

Keywords**:** Digital investing platforms, Young people preferences, Unit trust, Stock markets, Logistic regression

PART III

PART 3 ECONOMICS

Introduction

Economics is the focus of this chapter. Here, we present a collection of works by undergraduate students from the Mathematics with Economics programme, offered under the Faculty of Science and Technology (formerly known as the Faculty of Science and Natural Resources). The works encompass both theoretical knowledge and practical applications in the field of economics. Economics, as a branch of social science, studies how individuals, firms, and governments allocate limited resources to satisfy unlimited wants.

This chapter showcases the students' research outputs developed through the three main components of the economics courses in the programme – Microeconomics, Macroeconomics, and Finance. The studies explore a wide spectrum of economic issues, including inflation, capital markets, economic growth, financial behaviour, unemployment, wages, taxation, and policy impacts. Employing various econometric techniques such as panel data analysis, multiple linear regression, and time series modelling, these studies demonstrate the students' ability to integrate economic theory with quantitative analysis.

The projects are thematically organized into four key subtopics: Macroeconomic Analysis and Forecasting, Financial Markets and Monetary Policy, Development Economics and Financial Inclusion, and Socioeconomic Studies and Consumer Behaviour. Collectively, these works highlight how economic reasoning, supported by statistical and mathematical tools, can provide insights into national and regional issues affecting individuals, industries, and governments. Further references for each respective abstract presented in this chapter are available in hardcopy at the Library of the Faculty of Science and Technology.

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Macroeconomic Analysis and Forecasting

This subtopic focuses on understanding large-scale economic activities that influence national and regional development. The selected studies explore the dynamics of economic growth, inflation, employment, public debt, and the effects of global events such as the COVID-19 pandemic. Using methods like time series modelling and panel data analysis, these projects aim to forecast trends and evaluate the impact of macroeconomic policies across ASEAN and other international contexts. The findings reflect students' growing ability to analyze and interpret complex economic indicators, offering valuable insights for policymakers and researchers alike.

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CHAPTER 34

Analyzing the Impact of Public Debt on Economic Growth in E7 Nations

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Abstract
This study examines the dynamic relationship between public debt and economic growth in E7 nations which consists of Brazil, China, India, Indonesia, Mexico, Russia, and Turkey in time frame from 1992 to 2022. Employing the panel Autoregressive Distributed Lag (ARDL) model, this research investigates both the short-term and long-term impacts of public debt on economic performance. The findings reveal nuanced effects: while moderate public debt levels can stimulate growth in the short term, excessive debt leads to adverse outcomes, including reduced investment and heightened economic vulnerability, particularly in the long run. These results underscore the importance of prudent debt management policies to achieve sustainable economic growth in emerging economies. By contributing empirical evidence, this study offers insights into effective fiscal strategies tailored to the unique characteristics of E7 nations.

Keywords**:** Public debt, Economic growth, E7 nations, ARDL model

CHAPTER 35

Analyzing the Impact of Minimum Wage on Employment in Malaysia and Indonesia

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Abstract
This study investigates the impact of minimum wage policies on employment in Malaysia and Indonesia, examining how these policies affect different sectors and demographic groups. Utilizing data from the World Bank from 2014 to 2023 and employing Pooled Ordinary Least Squares (POLS) regression and panel data analysis, the research aims to achieve the objectives. The study found that increases in minimum wage can lead to lower employment rates, similarly to concerns about potential job losses. These positive effects are influenced by factors such as the economic environment, compliance with minimum wage laws, and the overall state of the economy. The study aims to offer practical recommendations for policymakers and stakeholders to balance fair wages with sustainable employment opportunities, contributing valuable insights into the dynamics of minimum wage policies and employment in Malaysia and Indonesia.

Keywords**:** Minimum wage, Employment rate, Participation rate, Pooled ordinary least square, Panel data analysis

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CHAPTER 36

The Impact of Minimum Wage on Unemployment Rate in Five Selected ASEAN Countries: A Panel Data Model Analysis

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Abstract
The main objective of this study is to examine the impact of minimum wage on unemployment rate in five selected ASEAN countries, namely Malaysia, Vietnam, Philippines, Indonesia, and Thailand. The yearly data used in this study consists of secondary data obtained from Trading Economics and World Bank Data from the period of 2013 until 2023. The dependent variable in this study is represented by unemployment rate while independent variable is represented by minimum wage and inflation rate is included as the control variable. This study performs panel data analysis with fixed effect model to analyse the relationship between dependent and explanatory variables in this study. The findings concludes that the minimum wage does not have a statistically significant impact on unemployment rate in ASEAN-5 countries. Hence, it indicates that variations in unemployment rate across the countries may be impacted by other economic and structural factors. This study recommends that the policymakers and government agencies take account into multiple factors which affect unemployment for more effective implementation of policies to address the unemployment.

Keywords**:** Minimum wage, Unemployment rate, Inflation rate, ASEAN-5, Fixed effects model

CHAPTER 37

The Effects of Climate Change on Economic Growth in Malaysia

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Abstract
The research project investigates the impact of climate change on Malaysia's economic development through an analysis of CO2 emissions alongside temperature along with precipitation since their influence on the nation's economic performance and development. This study uses data from sample of 30 observations from 1990 to 2020 to examine the connection between economic growth and climate change through the implementation of unit root test, Granger causality tests, and cointegration analysis in both short-term and long-term periods. Research data indicates that climate change significantly affects Malaysia's economic development by creating negative business sector impacts from rising CO2 levels and temperature. However, this study shows that precipitation serves as a stabilizing force in the extended time horizon. The research presents crucial information that may help practitioners design climate change mitigation strategies to protect economic outcomes in the country.

Keywords**:** Climate change, Economic development, CO2 emissions, Precipitation, Granger causality

CHAPTER 38

Post COVID-19 Monetary Policy Effect on Economic Growth in Five Selected ASEAN Countries: A Panel Data Series Analysis

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Abstract
This study examines the monetary policy effects, particularly policy interest rate, money supply and GDP deflator rate on economic growth mainly GDP growth rate in five selected ASEAN countries namely Malaysia, Thailand, Singapore, Indonesia and Philippines for the period of Q1 2020 to Q4 2023. The data in this study consist of secondary data obtain from the World Bank Data website. The dependent variable in this study is gross domestic product (GDP) growth rate. The independent variables in this study are policy interest rate, money supply and GDP deflator rate, act as the inflation rate. This study used a panel regression model analysis to observe the relationship between the dependent variable and the independent variables. A random effects regression model was used to examine the relationship between the GDP growth rate (a dependent variable) and important macroeconomic variables, specifically the money supply and interest rate (independent variables) while GDP deflator rate as the controlled variable. The findings indicate that GDP growth is significantly impacted by both the interest rate and the GDP deflator rate, with higher interest rates favorably correlated with economic growth, most likely as a result of better inflation control and fiscal restraint. On the other hand, it was discovered that the money supply had no discernible impact on GDP growth. This could be because of the economic disruptions brought on by the pandemic, which reduced the impact of liquidity injections on demand. The analysis emphasizes the intricate relationship that exists between inflationary pressures, monetary policy, and economic recovery in the aftermath of the pandemic. This study provides insights into the effectiveness of conventional policy tools in the face of global economic shocks and advances our understanding of how monetary policy promotes economic growth during times of crisis.

Keywords**:** Monetary policy, Economic growth, Panel regression model

CHAPTER 39

Forecasting the Number of International Visitor Arrivals in Indonesia Using Autoregressive Integrated Moving Average (ARIMA) Model

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Abstract
Indonesia's tourism sector has been significantly impacted by the COVID-19 pandemic, necessitating accurate forecasting for effective recovery strategies. This study forecasts international visitor arrivals to Indonesia using the Autoregressive Integrated Moving Average (ARIMA) model. Utilising monthly data from January 2014 to December 2023, sourced from Indonesia's Central Statistics Agency (BPS), the research analyses trends, assesses the impact of the COVID-19 pandemic, and develops an ARIMA model to predict visitor numbers for January to June 2024. The Box-Jenkins methodology is employed, incorporating stationarity testing via the Augmented Dickey-Fuller (ADF) test, ACF and PACF analysis for model identification, and parameter estimation using AIC and SIC, followed by diagnostic checking. The ARIMA (1,2,1) model is selected as the best fit, demonstrating good forecasting accuracy with a Mean Absolute Percentage Error (MAPE) of 13.20%. The results indicate stable visitor arrivals of approximately 1.2 million per month in the first half of 2024. This research offers valuable insights for Indonesian tourism stakeholders, supporting informed decision-making for tourism sector recovery and future planning. The study also acknowledges the limitations of the ARIMA model and recommends exploring advanced forecasting techniques and incorporating external factors in future research.

Keywords**:** ARIMA, Forecasting, International visitor, Tourism, Time series analysis

CHAPTER 40

Causality Between Bitcoin Price and Stock Market Indexes: An Empirical Analysis

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Abstract

Bitcoin has garnered considerable attention as a financial asset because to its decentralised characteristics and substantial volatility. This study investigates the causal relationship between Bitcoin prices and five key stock market indices—S&P 500, NASDAQ, Nikkei 225, Hang Seng Index (HSI), and Straits Times Index (STI)—from March 2019 to March 2024. The research examines the potential interactions and equilibrium between Bitcoin and conventional stock markets over an extended period, employing Vector Autoregression (VAR), Granger causality tests, unit root tests, and Johansen cointegration tests. This research had employed unit root tests (ADF and PP tests) to assess stationarity and validate the time-series data. The findings indicate that all variables are integrated of order one, $I(1)$, signifying they achieve stationarity following initial differencing. The Johansen cointegration test was utilised to examine the existence of a long-term equilibrium relationship between Bitcoin and the stock indices. The findings demonstrate the absence of cointegration, implying that Bitcoin and conventional stock indices do not exhibit synchronised movement over the long term. Although a long-term association is lacking, the Granger causality test reveals bidirectional short-term causality between Bitcoin and the Nikkei 225, indicating reciprocal influence between Bitcoin and Japan's stock market. Furthermore, we observe unidirectional causality between Bitcoin and NASDAQ/STI, suggesting that Bitcoin exerts effect on these indices without receiving reciprocal feedback. Nonetheless, we observe no substantial causal association between Bitcoin and the S&P 500 or HSI, suggesting its minimal influence on these markets. According to these findings, Bitcoin appears to function more as a speculative asset rather than a reliable hedge against fluctuations in the stock market. The behaviour is mostly influenced by short-term market mood, trade activity, and external financial events, rather than underlying economic connections.

Keywords**:** Bitcoin, Stock market indices, Unit root test, Johansen cointegration test, Granger-causality analysis

CHAPTER 41

The Impact of the COVID-19 Pandemic on Asean GDP Growth

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Abstract

The COVID-19 pandemic has significantly disrupted economic growth in ASEAN-6 countries (Indonesia, Malaysia, the Philippines, Singapore, Thailand, and Vietnam), affecting key economic indicators. This study employs panel data regression models, including Pooled OLS, Fixed Effects, and Random Effects, to assess the pandemic's impact on GDP growth and identify the most suitable econometric framework. The results indicate that higher COVID-19 mortality rates negatively affected economic activity by reducing consumer confidence, labor force participation, and productivity, while strict lockdown measures further constrained growth by disrupting supply chains and business operations. Conversely, global trade imports contributed marginally to economic recovery, underscoring the importance of international economic connectivity. Model selection tests favored the Random Effects model, confirming that country-specific factors, though relevant, do not strongly correlate with key explanatory variables, while diagnostic tests validated the robustness of the findings. These insights highlight the need for ASEAN nations to implement policies that balance public health measures with economic resilience, ensuring sustainable recovery. Future research should explore long-term economic adjustments, considering additional macroeconomic factors such as fiscal policies and labor market dynamics.

Keywords**:** COVID-19, ASEAN economic growth, Panel data regression, Lock down effects, Global trade

Financial Systems, Monetary Policy, and Inclusive Development

This subtopic encompasses studies that examine the interconnected roles of financial markets, monetary policy, and inclusive economic development. The selected works explore how financial systems, investment behaviour, and policy interventions influence economic growth and stability across local and regional contexts. Topics include the relationships between stock markets, cryptocurrency, and macroeconomic variables, as well as the impact of monetary and fiscal policies in mitigating global and domestic economic challenges.

At the same time, these studies highlight the importance of financial inclusion and development-oriented policies, focusing on areas such as microfinance, taxation, and the growth of small and medium enterprises (SMEs). Employing analytical methods such as ARIMA forecasting, causality analysis, and panel data modelling, the research demonstrates how economic development is shaped not only by market performance but also by equitable access to financial resources. Collectively, these works underscore the vital role of sound financial systems and inclusive policy frameworks in promoting sustainable and balanced economic progress.

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CHAPTER 42

The Relationship Between Money Supply, Real Interest Rates and Currency Exchange Rate in Five Selected Asean Countries Using Panel Data Analysis

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Abstract
This study investigates the relationship between currency exchange rate, money supply, and real interest rate in five selected ASEAN countries. Annual data from 2014 to 2023 has been collected to identify the influence of money supply and real interest rate towards currency exchange rate in ASEAN-5. The analysis utilises fixed effect model to analyse the variables which includes currency exchange rate as dependent variable, money supply and real interest rate as independent variables. The findings reveal that there is a statistically significant negative relationship between money supply and currency exchange rate. Currency exchange rate tends to decrease as money supply increases. However, there is no significant relationship between real interest rate and currency exchange rate. The changes of real interest rate will not affect the currency exchange rate of ASEAN-5. These findings will contribute to a deeper understanding of exchange rate dynamics in ASEAN-5 countries and offer valuable insights for policymakers, central banks, and investors operating within the region.

Keywords**:** ASEAN-5, Currency exchange rate, Money supply, Real interest rate, Fixed Effect Model (FEM)

CHAPTER 43

The Impact of Microfinance on Financial Literacy and Financial Well-Being Among Women in Small and Medium Enterprises in Sabah

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Abstract

This study aims to investigate the effect of microfinance program in improving financial literacy and financial well-being of women in Small and Medium Enterprises (SMEs) in Sabah. The main questions are to evaluate the differences in financial literacy between women who have participated or not in microfinance programs and the link between financial literacy and financial well-being irrespective of participation in a microfinance program. The study adopted quantitative research design and structured survey, which was distributed to 170 women entrepreneurs. After a normality assessment, statistical methods, namely, Mann-Whitney U test and Spearman's rank correlation, were utilized to analyze the data. The results show no evidence of significant difference in financial literacy by participation of participants or nonparticipants of microfinance programs, thus implying that the effect of microfinance participation on financial literacy is not substantial. Although there is a moderate positive correlation ($r = 0.505$, $p < 0.001$) between financial literacy and female entrepreneurship's financial well-being, the connection indicates the significant significance of financial literacy in the financial well-being of women entrepreneurs. These results are consistent with other studies pointing towards the imperative necessity for embedding financial education into microfinance facilities so that they can succeed. The study makes suggestions to incorporate mandatory financial literacy in Microfinance programs, and cover content such as control of budget, management of debts and electronic finance. Furthermore, policy interventions in the form of subsidized business development support to women entrepreneurs are proposed to overcome the plurality of problems confronting women entrepreneurs. Finally, the insights from this research explore provide useful directions for policymakers, microfinance institutions, and development agencies that are interested in promoting economic empowerment of women in SMEs.

Keywords**:** Microfinance, Financial literacy, Financial well-being, Women entrepreneurs

CHAPTER 44

The Impact of Taxation on the Profit of Small and Medium Enterprise (SME) In Malaysia

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Abstract
This study aims to investigate the impact of taxation on the profitability of Small and Medium Enterprises (SMEs) in Malaysia which play an important role in the national economy by contributing to job creation, innovation and GDP growth. Although there are various tax incentives and regulations aimed at fostering SME growth, a comprehensive understanding of how taxes affect SME profitability is still limited. Next, this study uses a descriptive design, and data is collected through a questionnaire distributed to 110 participants from various SME sectors. Data analysis was performed using descriptive methods, simple linear regression analysis and frequency testing. The results of the study show that high tax rates have a negative impact on the profitability of SMEs. An increase in tax rates increases production, distribution, and marketing costs, which in turn causes product prices to increase and demand to decrease. Therefore, this will reduce the profitability of SMEs and slow down the economy. In addition, this study identified some of the main challenges faced by SMEs related to taxation including high tax rates, complicated tax compliance processes and lack of information on tax incentives. To overcome this challenge, the study suggests several measures including the reduction of tax rates, simplifying the tax payment process and increasing the dissemination of information on tax incentives. This is expected to increase tax compliance and further increase the profitability of SMEs. Overall, this study provides an important contribution in understanding how taxation affects SMEs in Malaysia and identifies the challenges and steps SMEs need to take to address these challenges.

Keywords: Taxation, Profitability, Small and Medium Enterprise, Malaysia, Operating cost

CHAPTER 45

The Role of Monetary Policy in Controlling the Effects of the COVID-19 Pandemic on the Asean-5 Stock Market: A Panel Data Analysis

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Abstract
This study investigated the impact of the COVID-19 pandemic on the stock market and the effectiveness of monetary policy in minimizing the negative effects of COVID-19 in five selected ASEAN countries. The panel data regression method is used to examine the results of the panel data. After analyzing the data using several models such as the pooled OLS model (POLS), fixed effect model (FEM) and random effect model (REM), this study also used Chow test, Hausman test and Breusch Pagan LM test to evaluate the appropriate model and conducted diagnostic tests to ensure that the model met the classical assumptions. The findings of the study showed that monetary policy has a significant impact on the ASEAN-5 stock market index. This study confirmed that monetary policy played a role in stabilizing the ASEAN-5 stock market during the COVID-19 pandemic. These findings provide important implications for policymakers in developing economic strategies that are more responsive to the global financial and health crises.

Keywords: Monetary policy, Stock index, COVID-19, ASEAN-5, Panel data analysis

CHAPTER 46

Investigating the Relationship Between Gold Prices and Macroeconomic Variables: A Panel Data Analysis Comparing Consumer and Producer Countries

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Abstract
This study aims to investigate the relationship between gold prices and macroeconomic variables using a panel data analysis approach. The objective is to determine the impact of interest rates, inflation, stock market indices, geopolitical risk indices, and exchange rates on gold price movements across two types of countries, the gold producer and consumer of gold. The study then utilizes quarterly data from 2018 to 2023 that were obtained from reputable economic databases such as Trading Economics, Investing.com, and CEIC. Then, in order to achieve a robust estimation, the research employs panel data regression models that include Pooled Ordinary Least Squares, Fixed Effects Model, and Random Effects Model. The Hausman and Chow tests were used to guide the model selection. After that, diagnostic tests such as heteroscedasticity, autocorrelation, and multicollinearity analyses were done to ensure the reliability of the chosen model's findings. The results from this study found that in producer countries, exchange rates and stock market indices significantly influence gold prices, while in consumer countries, only exchange rates have a significant impact on gold prices, supporting the theory that gold serves as a hedge against currency depreciation and uncertainty in the stock market. The study highlights the importance of incorporating gold in investment portfolios to mitigate financial risks in volatile market conditions.

Keywords**:** Gold prices, Panel data analysis, Economic variables, Geopolitical risk, Safe-haven asset

CHAPTER 47

Assessing the Role of Financial Development in Promoting Economic Growth: An ASEAN-6 Case Study

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Abstract
The main objective of this study is to examine the role of financial development in economic growth among ASEAN-6 countries. Overall, the study aims to investigate the impact of financial development on economic growth in six ASEAN countries from 2013 to 2022 and to determine the appropriate panel data regression model to explain the relationship between the variables studied. This study will employ panel data regression approaches, including the fixed effects model, random effects model, and pooled OLS model, using the statistical software EViews version 12. Secondary data for the study is sourced from the World Development Indicators, a database maintained by the World Bank. Economic growth will act as the dependent variable, measured through gross domestic product, while the independent variables include determinants of financial development such as foreign direct investment, inflation, trade openness, capital formation, and exchange rate. The fixed effects model was elected as the best model to examine the role of financial development in economic growth among ASEAN-6 countries. The findings indicate that trade openness and capital formation have a positive impact, while foreign direct investment, inflation, and exchange rates have a negative impact on the economic growth of ASEAN-6 throughout the observation period. This study indicates that strengthening financial development is essential due to its significant role in stimulating the economic growth of ASEAN countries.

Keywords**:** Financial Development, Economic Growth, Fixed Effects Model, Random Effects Model, Pooled OLS Model

CHAPTER 48

Forecasting Gold Prices Using ARIMA Model

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Abstract
The price of gold plays a crucial role in global financial markets, often serving as a hedge against economic instability and inflation. Accurately forecasting gold prices is vital for investors, policymakers, and economic analysts. This dissertation explores the effectiveness of the ARIMA (Autoregressive Integrated Moving Average) model in forecasting gold prices using monthly historical data from January 2014 to December 2023. The study follows the Box-Jenkins methodology, which includes model identification, estimation, and diagnostic checking to select the optimal ARIMA model for forecasting. The primary objective is to determine the best-fitting ARIMA model by analysing key indicators such as gold price volatility and trends, employing diagnostic tests like the Durbin-Watson and Ljung-Box tests to assess model adequacy. The findings show that the ARIMA (6,1,1) model provides the best forecast accuracy, outperforming alternative models in terms of error metrics like RMSE, MAPE, and MAE. This model demonstrates a high level of reliability in predicting future gold prices, offering valuable insights for investors and market participants. This research contributes to the growing body of knowledge on statistical modelling in financial forecasting, particularly for volatile commodities like gold. It also highlights the strengths and limitations of the ARIMA model in this context, suggesting avenues for future research that could include incorporating additional economic factors or testing more complex models.

Keywords**:** Gold price forecasting, ARIMA models, Box-Jenkins methodology, Time series analysis, Model selection

Socioeconomic Studies and Consumer Behaviour

This subtopic delves into the human dimension of economics, exploring how social, psychological, and demographic factors shape consumer choices, labour outcomes, and market behaviour. The studies address issues such as online purchasing trust, gender wage disparities, marketing influence, and the effects of inflation and unemployment on growth. Combining survey data with quantitative modelling, these works reflect the interdisciplinary nature of modern economics – where behavioural insights complement traditional financial and macroeconomic analysis to better understand real-world market dynamics.

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CHAPTER 49

Gender Wage Disparities Across Industries in Malaysia

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Abstract
This study examined the gender wage gap in Malaysia and used multiple linear regression to identify possible contributing factors. This study was based on the 2022 Household Income Survey (HIS) data from the Department of Statistics Malaysia (DOSM), which had 22,681 respondents. In this study, total wages per month are the dependent variables. The independent variables used in this study are gender, educational attainment, marital status, strata, state, occupation category, and industry. All the independent variables show a significant influence on wages for both genders. However, several sectors under industry do not significantly affect the difference in wages. The multiple linear regression results suggest that demographic factors, human capital, and job characteristics significantly contributed to the gender wage difference. The gender wage gap persists, with women earning less than men, even though they have similar qualifications. Additionally, industry-specific suggest that even within female dominated industries, men receive a wage premium than women. The findings highlight the importance of targeted policy interventions to address structural inequalities within Malaysia's labour market.

Keywords**:** Gender wage disparities, Malaysia labour market, Industry, Multiple linear regression

CHAPTER 50

The Effect of Instagram Marketing Activities on Customer-Based Brand Equity in the Local Fashion Industry

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Abstract
Instagram is an effective visual marketing tool for increasing consumer perceptions of a business. Thus, the purpose of this study is to examine how Instagram marketing activities affect customer-based brand equity (brand awareness, brand image, perceived quality, and brand loyalty) in the local fashion industry. To do this analysis, the data were collected from 316 respondents who had used fashion brand Instagram accounts through an online questionnaire, and SPSS AMOS 28 was used to apply Confirmatory Factor Analysis (CFA) and Structural Equation Modelling (SEM) methods. Specifically, this study provides a thorough illustration of how Instagram marketing efforts impact customer-based brand equity. Findings from this study may help local fashion brands to predict their customers' purchasing behaviours through Instagram marketing activities and eventually improve their brand equity management.

Keywords**:** Instagram marketing activities, Customer-based brand equity, Confirmatory Factor Analysis (CFA), Structural Equation Modelling (SEM)

CHAPTER 51

Trust, Intention and Fraud: Insights into Consumer Behaviour in Online Purchasing

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Abstract
This study examines the relationship between trust, purchase intention, scam perception, and online purchasing behaviour among young adults in Sabah. The research aims to examine the impact of trust on purchase intention and online purchasing behaviour, analyze the effect of online scam perception on purchase intention and online purchasing behaviour, and investigate the influence of demographic factors on vulnerability to online scams. A survey-based approach was utilized, with a multiple linear regression model applied to assess the relationships among the variables. The findings indicate that trust significantly influences purchase intention, which, in turn, affects online purchasing behaviours. However, online scam perception was not a significant predictor of either purchase intention or purchasing behaviour. Demographic factors, such as being part of the younger generation, male, and having a lower income, were found to increase vulnerability to scam experiences. Despite limitations, such as convenience sampling and the discrete nature of the data, the study highlights the critical role of trust in driving online purchasing decisions. The results emphasize the need for e- commerce platforms to adopt trust-building strategies to foster consumer confidence. Future research could explore alternative models and additional factors, such as socio- economic status and digital literacy, to further understand the dynamics of online purchasing behaviour.

Keywords**:** Online purchasing behaviour, Trust, Purchase intention, Online scam perception

CHAPTER 52

The Effect of Inflation Rate, Interest Rate, and Unemployment Rate on Economic Growth: A Comparative Study of Malaysia and Indonesia

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Abstract
Economic growth in Malaysia and Indonesia is assessed with respect to inflation rate, interest rate and unemployment rate within this study. The research analyzes both strong term and short-term linkages between macroeconomic variables through time series econometric examination which includes unit root tests combined with Johansen cointegration tests and Vector Error Correction Models (VECM). The analysis proves that inflation together with interest rates and unemployment creates a unified impact which shapes GDP development in both nations. The examination outcomes established vital distinctions between the influence pattern of macroeconomic indicators between Malaysia and Indonesia because of their different economic patterns and regulatory approaches. The research shows that stable macroeconomic conditions positively support long-term economic expansion. Such insights create valuable information to guide the development of strong monetary and fiscal approaches.

Keywords**:** Economic growth, Macroeconomic variables, Inflation rate, Johansen cointegration test, Vector Error Correction Model (VECM)

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PART IV
CONCLUSION

The abstracts presented in Bridging Science and Society highlight the richness that emerges when mathematical, statistical, and economic perspectives converge. Through their diverse themes and methodologies, these samples reveal that meaningful inquiry often requires more than technical skill, it demands curiosity, creativity, and an awareness of the broader social contexts in which knowledge is applied.

As readers move from one abstract to another, a clear pattern emerges: the boundaries between disciplines are not barriers, but bridges. Mathematics and statistics provide the precision and structure necessary for understanding complexity, while economics offers insight into the human, institutional, and societal dimensions that shape data and decisions. Together, they demonstrate how interdisciplinary thinking can lead to more comprehensive and impactful approaches to research and problem-solving.

This compilation does not claim to exhaust the possibilities of integration between science and social science. Rather, it serves as an invitation to students, educators, and researchers alike to continue exploring new ways of connecting quantitative reasoning with social insight. By fostering this dialogue between scientific analysis and social understanding, we move closer to building a more informed, responsive, and collaborative world of scholarship.

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