BICM RESEARCH SEMINAR SERIES

BICM Research Seminar 49

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Paper details	
Title	**How Can Business Maintain Sustainability: Predicting Sustainable Growth Using Hybrid Ensemble ML Model?**
Author	**Imran Mahmud** Lecturer Bangladesh Institute of Capital Market
Presentation details	
Presenter researcher	**Imran Mahmud**
Date	20 November 2025 (Thursday)
Time	02:30 – 03:30 PM
Venue	BICM Multipurpose Hall
Expected Participants	Faculty Members of BICM & Invited Guests
Discussants	**Dr. K.M. Zahidul Islam** Professor Institute of Business Administration Jahangirnagar University
	Istequemal Hussain Director Debt Management Department Bangladesh Bank

About the Presenter
Mr. Imran Mahmud holds a Master of Business Administration (MBA) and a Bachelor of Business Administration (BBA) with a major in Finance from the Department of Finance, University of Dhaka, where he demonstrated exceptional academic performance and was honored with the Dean's Merit Award for his outstanding results. He has also successfully completed CFA Level I and CFA Level II, reflecting his strong analytical foundation and commitment to professional excellence in finance. He began his academic career as a Lecturer in Finance at Notre Dame University Bangladesh, where he developed his passion for teaching and research. In July 2022, he joined the Bangladesh Institute of Capital Market (BICM) as a Lecturer, further expanding his engagement with financial education and capital market development. Currently, Mr. Imran is pursuing a Master of Science in Data Science and Analytics at East West University, Bangladesh, broadening his expertise in quantitative and computational techniques essential for modern financial analysis. His academic and professional interests encompass behavioral finance, empirical research in finance, machine learning and big data applications in finance, corporate governance, and capital market development. His continuous pursuit of interdisciplinary knowledge and research-driven insight reflects his aspiration to bridge traditional finance with emerging data-driven approaches to decision-making and policy formulation.

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The paper abstract is given below. If you have any questions regarding the seminar or you wish to present a paper or invite a guest researcher, please do not hesitate to contact S. M. Kalbin Salema, Assistant Professor, BICM at kalbin@bicm.ac.bd.

How Can Business Maintain Sustainability: Predicting Sustainable Growth Using Hybrid Ensemble ML Model?

Imran Mahmud[1]

Abstract

The Sustainable Growth Rate (SGR) is a cornerstone of corporate financial strategy to achieve economic sustainability. Yet traditional linear models often fail to capture the complex, non-linear dynamics that dictate a firm's growth potential in emerging markets. This study develops a comprehensive machine learning (ML) framework to accurately predict SGR for non-financial firms listed on the Dhaka Stock Exchange (DSE). We integrated a multifaceted dataset spanning 2010-2021, encompassing firm-specific financial ratios, corporate governance attributes, and macroeconomic indicators for 117 companies across 19 sectors. A rigorous analytical pipeline was executed on both Python and Weka platforms, employing a diverse suite of algorithms, including linear models, tree-based ensembles, and neural networks. While Python-based mixed effect random forest backed on extreme gradient boosting (MERF-XGBoost) demonstrated strong performance (R^2 = 0.76), the Weka implementation yielded even more robust results, with its MERF-XGBoost algorithm achieving a superior correlation coefficient or R^2 of 0.8528 and the lowest Mean Absolute Error (0.2948) among all tested models including variance explained PCA features. Tree-based ensembles in Weka, including light gradient boosting (LGBM-Correlation R^2: 0.8302), consistently and significantly outperformed all linear and neural network counterparts, confirming the inherent non-linearity of SGR determinants. Feature importance analysis across both platforms revealed that firm-specific financial factors, most notably profitability (EPS), and dividend policy, are the paramount drivers of sustainable growth, while macroeconomic variables showed less direct influence. Market-position variables (Tobin's Q, largest competitor, market share) also contribute meaningfully, reflecting competitive dynamics in growth sustainability. Corporate governance features show moderate but non-negligible influence. This research concludes that advanced tree-based ML models, particularly hybrid gradient boosting, provide a superior paradigm for SGR forecasting. The study delivers a powerful, validated tool for financial managers and investors, enabling data-driven strategic planning and investment decisions by pinpointing the key levers of sustainable corporate growth.

Keywords: Sustainable growth, mixed effect random forest, extreme gradient boosting, PCA, Machine Learning

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