A DATA-DRIVEN APPROACH FOR SUPPORTING CO-OPERATIVES PERFORMANCE EVALUATION AND PREDICTION

Mbilinyi, Shadrack. P.
The Mzumbe University (MU), Tanzania
2022

This study is positioned within the global discussions around the application of data-driven approaches in performance evaluation and prediction. From the Tanzanian context, the study aims to develop a data-driven approach that will aid in evaluating and predicting co-operatives performance for improved co-operatives supervision and control in Tanzania. The rationale for doing this study is founded on the notion that co-operatives in Tanzania collapsed as a result of poor evaluation and prediction practices are reported to be around 20% to 47% per annum. This raises questions regarding the efficacy of the current evaluation and prediction approaches employed by the regulator of co-operatives. Design science research (DSR) was employed as the main guiding methodology. In order to complete each phase of the DSR, the researcher reviews eleven (11) publications on co-operatives performance features; conducts two (2) focus groups and requirements workshops with seven (7) participants from Tanzania Co-operative Development Commission (TCDC) to discuss topics on co-operatives performance related issues; and extracts dataset from Wazalendo SACCOS Ltd for the years 2015 to 2022 in order to identify features significantly influencing co-operatives performance. During the development stage, four (4) algorithms (RF, LR, KNN, and DT) were used to train the developed data-driven model using 80% of the selected SACCOS dataset. Three (3) evaluation metrics (R2, MAE, and RMSE) were used to measure the performance of the trained data-driven model using the remained 20%. The measurement results found the best algorithms to be RF, LR, and DT. The RF achieved R2, MAE and of RMSE of 0.97, 0.29, and 0.52 respectively when assessing capital adequacy (core capital / total assets). On the other hand, LR was able to generate scores of 0.96, 0.97, and 1.00 of R^2, 0.36, 0.59, and 0.00 of MAE as well as 0.49, 0.71, and 0.00 of RMSE when assessing asset quality-01 (non-performing loans / gross loan portfolio), asset quality-02 (non-earning assets / total assets), and asset quality-04 (write offs less recoveries/ total loans) respectively. Moreover, DT got the scores of 0.97 of R^2, 0.00 of MAE, and 0.00 of RMSE when assessing asset quality-03 (general loan loss reserve /gross loans). Thus, the scores bring about the potentiality of the developed model to regulator of co-operatives and decision makers to comprehend the effectiveness of data-driven approaches so as to justify the total adoption in co-operative industry in Tanzania.

Keywords: *predictive model, machine learning algorithms, evaluation metrics, prototype, co-operatives, performance prediction, performance evaluation.*