



Financial Forecasting and Scenario Planning for Startups: A Case Study of Eternal Ltd

UMESH P C¹, DR. R N KULKARNI²

¹Department of Management Studies, Ballari institute of Technology and Management, Ballari

²Department of CSE, Ballari Institute of Technology and Management, Ballari

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Abstract - Financial forecasting and scenario planning for startups is an application for analyzing historical revenues, expenses and profitability and for supporting future financial planning. This study uses Eternal Ltd. as a case study and uses quarterly financial data for analysis. Two forecasting models, ARIMA and Linear Regression, are implemented and evaluated using Mean Absolute Error (MAE), Root Mean Squared Error (RMSE), and R² Score. The better-performing model is selected for next-quarter revenue forecasting. Scenario planning is then performed using optimistic, realistic, and pessimistic situations. A Streamlit dashboard integrates financial analysis, data visualization, forecasting, model comparison, scenario analysis, and report generation.

Index Terms— Financial Forecasting, Scenario Planning, Startups, Eternal Ltd., ARIMA, Linear Regression, MAE, RMSE, R² Score, Streamlit.

I. INTRODUCTION

Business finance plays an important role in development and expansion. Financial management for startups is critical because of limited resources, market fluctuations, unpredictable revenues, and growing competitive pressures. Knowledge of previous financial performance and projections of future results can

support decisions regarding budgets, investments, growth, and resource management.

Financial forecasting predicts earnings and profits by analyzing historical information. It can help identify patterns in revenues, costs, and profit margins. With advances in financial analytics and machine learning technologies, historical financial information can be used for projection and planning.

The present study develops a financial forecasting and scenario planning application using Eternal Ltd. as a case study. The analysis considers historical quarterly financial information and uses ARIMA and Linear Regression to forecast revenue. Model performance is assessed using MAE, RMSE, and R² Score. Scenario planning is then used to represent optimistic, realistic, and pessimistic possibilities.

A. Problem Statement

Develop an application that helps design startup finances through revenue projections and scenarios based on past performance.

B. Objectives

(1) Collect and analyze historical financial information of Eternal Ltd.; (2) analyze revenue history using financial reports and graphs; (3) develop revenue projections using ARIMA and Linear Regression; (4) assess forecasting models using MAE, RMSE, and R² Score; (5) identify the better-performing model and forecast the next quarter; (6) create positive, moderate, and negative financial scenarios; and (7) provide a web application for viewing financial information, forecasts, and scenarios.

II. RELATED WORK

Financial forecasting and startup planning have been studied using statistical methods, machine learning, deep learning, and scenario analysis. Mashrur examined the relationship between financial forecasting and startup resilience [1]. Wasserbacher and Spindler discussed machine learning for financial forecasting, planning, and analysis [2]. Cropper and Cowton



highlighted scenario modelling as a planning approach for considering alternative financial situations [3].

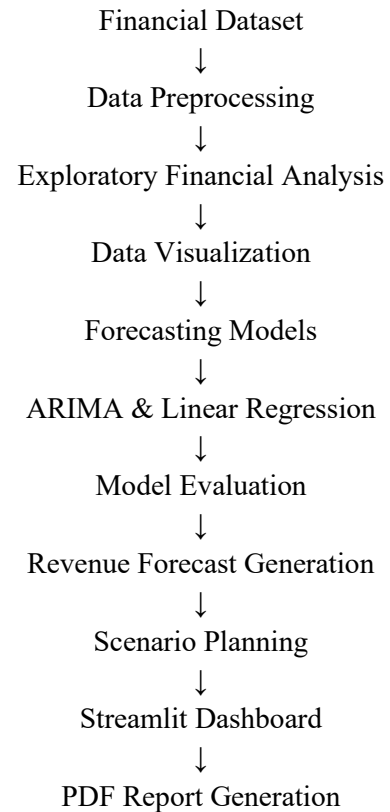
Raman et al. examined hybrid machine learning and deep learning approaches for financial forecasting [5]. Tang, Xu, and Ling reviewed machine learning methods used in financial forecasting during the big data era [8]. Liu and Skerratt investigated prediction of future cash flows using historical company information [4]. Subrahmanyam et al. examined AI for business planning, forecasting, and resource allocation [7], while Kaur et al. discussed AI applications in financial management and predictive analysis [6].

Other studies considered financial time-series forecasting using machine and deep-learning models [9], attention-based LSTM methods [10], and forecasting success in equity crowdfunding [11]. Research on startup success prediction and machine-learning-based decision support also provides context for the present study [12]–[16].

The research gap identified in the project is the need for a simple integrated framework that combines company-level financial forecasting, model comparison using MAE, RMSE and R^2 , selection of the better-performing model, and scenario planning based on the forecast.

III. METHODOLOGY

The methodology suggested is based on a systematic approach which involves the analysis of historical financial data, the development of forecasting models, the assessment of their performance, the preparation of forecasts of future revenue, and the carrying out of scenario analysis.



The above workflow is the block diagram of the financial forecasting and scenario planning application.

A. Data Collection

The data needed for this study were collected from secondary sources, with the historical quarterly financial data of Eternal Ltd. being used for the purpose of financial analysis and forecasting. The financial dataset includes the quarterly observations needed to analyse the company's historical financial performance.

The key financial variables considered in the project are Revenue, Operating Expenses, Operating Profit, and Net Profit, with quarterly revenue being used as the main variable when developing the forecasting models.

The financial data is compiled in chronological order to preserve the time-series structure needed for forecasting, after which the dataset is processed and prepared before being given to the forecasting models.



B. Dataset

The dataset includes historical financial data for Eternal Ltd., with the financial information arranged in quarterly basis in order that variations in the company's financial performance over time may be analysed.

The dataset contains the key financial variables needed for exploratory analysis and visualization; revenue is chosen as the variable to be forecasted since it is a significant indicator of business growth and financial performance.

Before carrying out the forecast, the dataset is checked for missing values, incorrect formats, and inconsistencies in the chronological order. This guarantees that the financial information given to the forecasting models is correctly structured.

C. Forecasting Models

Two forecasting models, ARIMA and Linear Regression, were applied to historical quarterly revenue data.

The quarterly revenues are fed to develop two types, arima as well linear regression forecasts models. The models' performance is assessed using the Mean Absolute Error (MAE), the Root Mean Squared Error (RMSE), and the R^2 Score.

D. Model Evaluation

The models were evaluated using:

- Mean Absolute Error (MAE)
- Root Mean Squared Error (RMSE)
- R^2 Score

Lower MAE and RMSE values indicate less forecasting error, while a higher R^2 Score shows a better capability to explain variations in the observed data.

E. Revenue Forecast Generation

A good performing algorithm is selected so as to generate the projection of revenues coming within 3 months from now. Forecasting values are also used during scenario studies to develop best-case, most likely cases and worst scenario estimates on finances.

F. Scenario Planning

Financial forecasting provides an expected future value, but actual financial performance may differ due to changes in market and operating conditions. Therefore, scenario planning was included in the application.

Three potential financial scenarios are considered:

- Optimistic Scenario: Represents a positive financial outcome where revenue exceeds the expected forecast.

- Realistic Scenario: Represents the anticipated financial outcome based on the revenue forecast from the selected model.
- Pessimistic Scenario: Represents a negative financial outcome where revenue falls below the expected forecast.

G. Financial Forecasting Dashboard

The complete financial analysis and forecasting system is integrated into an interactive Streamlit dashboard.

The dashboard offers various analytical options, including Show Dataset, Dataset Information, Descriptive Statistics, Revenue Trend, Expense Trend, Operating Profit Trend, Net Profit Trend, forecasting, model evaluation, and other financial analysis functions.

C. Unit Testing

Unit testing was performed on data loading, preprocessing, financial analysis, visualization, ARIMA forecasting, Linear Regression, model evaluation, forecast generation, scenario planning, and PDF reporting.

IV. RESULTS AND DISCUSSION

A. Quarterly Revenue Trend

The quarterly revenue trend was analyzed to track the changes in Eternal Ltd.'s revenue over the selected period. Revenue is the primary financial variable considered for forecasting in this project.

The historical quarterly revenue data serves as the foundation for identifying the overall trend and developing the forecasting models.

The graph displays the quarterly revenue changes of Eternal Ltd. throughout the study period. The revenue shows an overall upward trend, though the growth rate varies from quarter to quarter. A marked increase appears in the later quarters of the dataset. This historical revenue pattern is essential for the ARIMA and Linear Regression forecasting models.

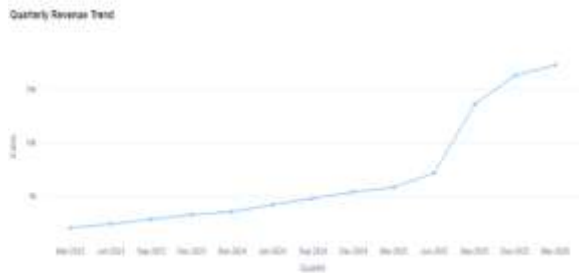


Fig. A. Quarterly Revenue Trend of Eternal

B. Quarterly Expense Trend

Operating expenses were analyzed to track changes in costs related to the company's operations. Analyzing expenses alongside revenue offers a clearer view of the overall financial performance.

Generally, expenses rise as revenue and business operations expand. Comparing the expense trend to revenue provides insight into the relationship between business expansion and operating costs.

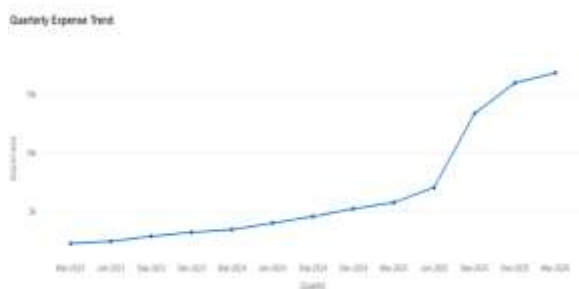


Fig. B. Quarterly Expenses Trend of Eternal Ltd.

C. Quarterly Trend in Operating Profit

Operating profit reflects the profit generated from the company's core business operations after accounting for operating expenses. The quarterly operating profit trend was analyzed to track changes in operational profitability.

The graph shows variations in operating profit across the selected quarters. The movement from weaker operating results in earlier periods to positive operating profit in later periods suggests an improvement in operational performance. However, fluctuations between quarters indicate that profitability does not always rise at the same rate as revenue.

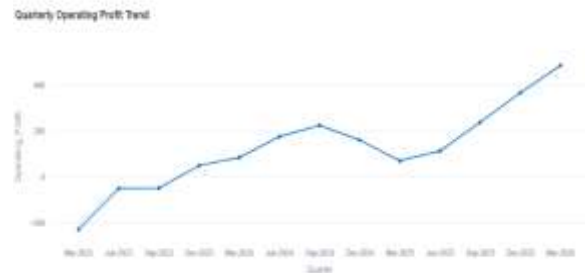


Fig. C. Quarterly Trend of Operating Profit of Eternal Ltd.

D. Quarterly Trend in Net Profit

The Company's Net profit was analyzed to assess the overall profitability of Eternal Ltd. after considering expenses and other financial components.

The graph depicts the changes in quarterly net profit over the study period. The quarterly values highlight variations in the company's overall profitability. Both increase and decrease in net profit mean that profitability may be influenced by various financial factors beyond just revenue growth. These findings provide a better understanding into the company's overall financial position.

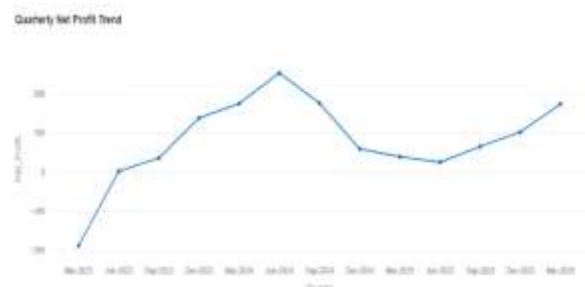


Fig. D. Quarterly Trend in Net Profit of Eternal Ltd.

E. Forecasting Model Comparison

Two forecasting models, ARIMA and Linear Regression, were applied to historical quarterly revenue data. Both models were assessed to determine which model performs better forecasting performance.

The models were evaluated using:

- Mean Absolute Error (MAE)
- Root Mean Squared Error (RMSE)
- R^2 Score



Lower MAE and RMSE values indicate less forecasting error, while a higher R^2 Score shows a better capability to explain variations in the observed data.

The evaluation results indicate that ARIMA outperforms Linear Regression for the financial dataset used in this study. ARIMA produces smaller forecasting errors and demonstrates better overall predictive performance. Thus, ARIMA is chosen as the best model for generating the next-quarter revenue forecast.

Model Comparison

Model	MAE	RMSE	R^2 Score
1. ARIMA	851.0011	1012.4731	0.8887
2. Linear Regression	2264.15	2332.407	0.7584

Fig. E. Performance Comparison of ARIMA and Linear Regression

F. Revenue Forecast Using ARIMA

Based on the evaluation results, ARIMA was selected to create the next-quarter revenue forecast.

The historical quarterly revenue observations up to March 2026 were used to estimate revenue for the following quarter, June 2026.

The graph illustrates the historical revenue values alongside the revenue predicted by the ARIMA model. The forecast gives an estimate of the expected revenue for the next quarter based on patterns identified in the historical data.

The predicted value generated through the application represents the base forecast for June 2026 and is later used in scenario planning.

ARIMA Sales Forecast

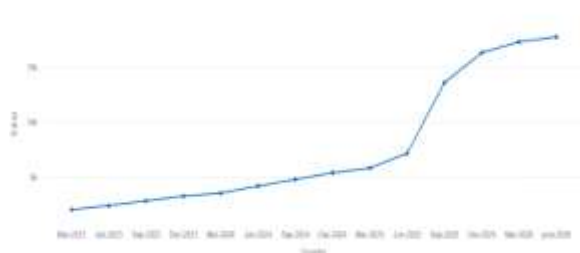


Fig. F. Revenue Forecast Using ARIMA

G. Scenario Planning

Financial forecasting provides an expected future value, but actual financial performance may differ due to changes in market and operating conditions. Therefore, scenario planning was included in the application.

The scenario analysis presents alternative revenue outcomes around the forecasted value. The realistic scenario aligns with the anticipated forecast, while the optimistic and pessimistic scenarios indicate possible upward and downward shifts.

Using different scenarios helps provide a broader understanding of potential future financial situations instead of depending only on a single predicted value. This can aid in financial planning and decision-making in uncertain situations.

June 2026 Sales Forecast Under Different Scenarios

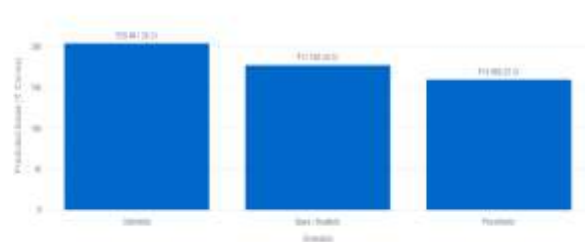


Fig. G. Revenue Scenario Planning Analysis

H. Financial Forecasting Dashboard

The complete financial analysis and forecasting system is integrated into an interactive Streamlit dashboard. Users can select different analytical options and view the related financial information, graphs, forecasting results, and scenario analysis.

The dashboard makes the financial forecasting process more interactive and visually understandable.

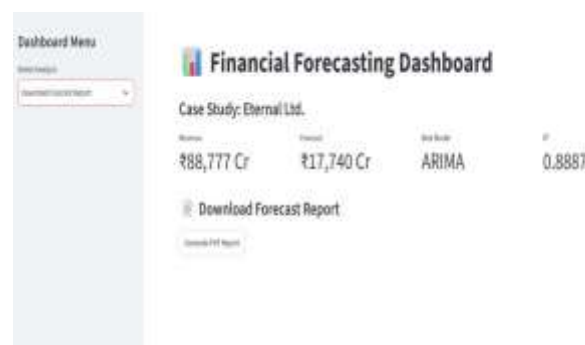


Fig. H. Financial Forecasting and Scenario Planning Dashboard



I. Discussion

From our research, we found out that past year-over-year earnings reports are useful for analyzing company's finances as well predicting its revenues going forward. Revenue growth rate, cost reduction trend, operating income increase as well as profit margin improvement is indicative of changes at eternal company's business results.

Comparison with respect to arima vs linear regression, there are many ways for predicting which will be accurate at a given point time. From our analysis of model evaluations conducted here we can see that arima performed well enough to be selected as a predictor of quarter 2 revenues.

Forecasting is extended with a planning element that takes account for best case scenarios as well worst-case ones regarding finances. It enables a study about what will be our earnings going to come out, not just how they are likely now.

The software effectively combines finance modeling, analytics display capabilities with arima as well linear regression predictions; assessment of models; stress testing scenarios to be presented on dashboards.

V. CONCLUSION

The project aimed to analyze the historical financial performance of Eternal Ltd. and forecast future revenue using quarterly financial data. Revenue, expenses, operating profit, and net profit were considered to understand financial trends.

ARIMA and Linear Regression were evaluated using MAE, RMSE, and R^2 Score. The project results indicated that ARIMA outperformed Linear Regression and was therefore selected for forecasting the next quarter's revenue.

The project also included optimistic, realistic, and pessimistic scenarios and developed a Streamlit dashboard for financial analysis, model comparison, forecasting, and scenario planning. The study concludes that combining financial analysis, forecasting, and scenario planning can improve financial planning and support data-driven decision-making, especially in a startup-focused business environment.

Table I. Unit Testing Results

Test Case No.	Test Case Description	Expected Result	Observed Result	Status
TC001	Verify financial dataset upload	The quarterly financial dataset should upload successfully.	The Eternal Ltd. quarterly financial dataset uploaded successfully. Invalid file formats showed an appropriate error message.	Pass
TC002	Verify data preprocessing	The uploaded dataset should be cleaned and prepared correctly.	Missing values were addressed, the data arranged chronologically, and the dataset was prepared successfully.	Pass
TC003	Verify exploratory financial analysis	Financial analysis should generate correctly.	Revenue, operating expenses, operating profit, and net profit were analyzed and displayed accurately.	Pass
TC004	Verify financial data visualization	Financial charts should display correctly.	The application created all required graphs without any display errors.	Pass
TC005	Verify ARIMA revenue forecasting	ARIMA should create the revenue forecast successfully.	ARIMA predicted next-quarter revenue using historical quarterly data effectively.	Pass
TC006	Verify Linear Regression forecasting	Linear Regression should create the revenue forecast successfully.	Linear Regression successfully generated the next-quarter revenue forecast.	Pass
TC007	Verify model evaluation	MAE, RMSE, and R^2 Score should be calculated accurately.	The evaluation metrics were calculated correctly and displayed for both forecasting models.	Pass
TC008	Verify revenue forecast generation	The application should create the final revenue forecast	The best-performing forecasting model successfully generated the	Pass



		using the selected model.	final next-quarter revenue forecast.	
TC009	Verify scenario planning	Optimistic, realistic, and pessimistic scenarios should generate successfully.	The application created and displayed all three financial scenarios correctly.	Pass
TC010	Verify PDF report generation	The application should create the financial analysis report successfully.	A PDF report with financial analysis, forecasting results, model comparison, and scenario planning was generated successfully.	Pass

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