International Journal for Multidisciplinary Research (IJFMR)
E-ISSN: 2582-2160 ● Website: www.ijfmr.com ● Email: editor@ijfmr.com

A Study on Financial Risk Prediction Using Arima

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ABSTRACT
This study explores the use of time-series forecasting to predict financial risks in SPR Construction Private Limited. Six years of secondary data covering revenue, borrowings, trade payables, current liabilities, and cash flows were analyzed using an analytical research methodology. Forecasting models such as ARIMA, SARIMA, Exponential Smoothing, and Regression techniques were applied, with ARIMA showing the highest accuracy. Results indicate improving revenue and profitability but also reveal rising liabilities and negative financing cash flows, suggesting potential risks. The study highlights the importance of integrating ARIMA forecasting into financial planning to improve risk management and support long-term sustainability.

Keywords: Financial Risk, ARIMA, Forecasting, Time-Series Analysis.

1. INTRODUCTION

The construction industry meets massive financial risks as a result of its capital-intensive nature, complex project cycles, and regulatory challenges. These risks, which include cost overruns, late payments, and cash flow disruptions, can have a significant influence on a company's financial health. As stakeholders demand timely project completion and profitability, construction firms must anticipate and manage financial risks proactively.

This study focuses on SPR Construction Private Limited, a major player in the Indian construction industry. The study will analyze six years of financial data to create a forecasting model that will use ARIMA (AutoRegressive Integrated Moving Average) to predict financial trends and detect potential threats.

SPR Construction, a company acknowledged for its sustainable infrastructure projects, has been trying to manage liquidity, credit exposure, and profitability. The study's goal is to determine whether the company is financially prepared to meet its obligations and continue to expand.

This study contributes to the emerging field of data-driven decision-making in the construction sector, namely in the management of financial risks using predictive models. By utilizing ARIMA, the study provides a framework that might assist SPR Construction, and possibly other organizations, in making informed financial decisions and reducing future risks.

2. NEED FOR THE STUDY

- This study focuses on financial challenges in the construction firm, such as cash flow issues,

unexpected expenses, and payment delays, which might disrupt financial stability.

- Use ARIMA to predict financial risks for better future planning.
- Utilize data-driven insights to influence strategic decisions about the company's financial strengths and shortcomings. This study addresses the limits of standard forecasting approaches, which frequently provide inaccurate and delayed insights into prospective financial hazards.
- Use ARIMA to predict financial risks for better future planning.

3. OBJECTIVES OF THE STUDY

1. To analyze financial risk tends using ARIMA
2. To assess the liquidity position by forecasting cash flow and trade receivables
3. To assess and predict credit risk
4. To study how ARIMA can help identify early sign of financial distress

4. SCOPE OF THE STUDY

This study will forecast financial risks such as liquidity, credit, and operational stability by analyzing trends in cash flow, trade receivables, and payables using ARIMA models. This examination will look at the company's capacity to meet short-term obligations and determine its financial stability.To discover ways to improve and optimize risk management procedures, this study will compare financial risk patterns to industry standards and look for variances in financial performance that could suggest financial instability.

5. REVIEW OF LITERATURE

X. Dong, B. Dang, H. Zang, S. Li, and D. Ma. (2024), The study investigates the efficiency of ARIMA in projecting financial hazards using historical financial records. The study uses ARIMA (3,1,3) to predict income, spending, and liability trends, assisting firms in identifying impending financial problems. The findings demonstrate that ARIMA may accurately estimate short-term financial risks, especially in structured financial data.

Pankaj Malik, Aditya Singh (2023), This study shows that ARIMA's ability to spot patterns and trends in time series data makes it a popular model for predicting financial risk. It is particularly effective for short-term revenue, cash flow, and liability forecasting. Although ARIMA is praised for its ease of use and interpretability, it may be extraordinarily successful for managing excessively variable or non-linear data, which stresses

6. RESEARCH METHODOLOGY

The research methodology for this study is analytical research, with secondary data obtained from SPR Construction Pvt Ltd, like financial statements. The primary data analysis tool is ARIMA (Auto-Regressive Integrated Moving Average), a mathematical model for forecasting time series data. ARIMA is useful for interpreting trends and forecasting future values based on past observations. The analytical methodology aims to assess financial risk and predict trends in the dataset, consequently providing significant insights into the organization's financial performance and risk management.

7. DATA ANALYSIS AND INTERPRETATION

TABLE:1 ACTUAL FINANCIAL PERFORMANCE OF SPR CONSTRUCTION PVT LTD

Year	Borrowing (Lakhs)	Trade Payable (Lakhs)	Current Liabilities (Lakhs)	Revenue (Lakhs)	Net Profit (Lakhs)	Cash flow from Operating activities (Lakhs)	Cash flow from Investing activites (Lakhs)	Cash flow from Financing activity (Lakhs)
2019	73480.94	4976.38	14955.5	6651.67	-1432.01	3008.69	5224.85	8217.77
2020	62171.67	7486.64	28130.66	6332.40	-2108.03	10299.10	3266.99	-13284.40
2021	78633.50	6645.66	22671.6	3393.46	-3187.72	517.04	1167.30	-1440.60
2022	68320.59	6707.63	42332.3	28000.32	-2812.88	-9123.03	12595.74	7436.71
2023	38629.92	10034.89	63422.1	37106.27	-985.89	12476.23	247.75	-12802.40
2024	55408.82	11679.79	42617.12	38684.91	617.60	38318.40	-35.00	-37447.87

TABLE:2 FORECAST OF FINANCIAL PERFORMANCE USING ARIMA MODEL

Year	Borrowing (Lakhs)	Trade Payable (Lakhs)	Current Liabilities (Lakhs)	Revenue (Lakhs)	Net Profit (Lakhs)	Cash flow from Operating activities (Lakhs)	Cash flow from Investing activites (Lakhs)	Cash flow from Financing activity (Lakhs)
2025	39111.87	12817.11	66217.14	35654.35	617.6	100022.24	-1369.7	-50705.75
2026	39506.39	13990.89	61101.09	38684.5	617.6	182888.37	-2153.22	-62023.35
2027	31477.68	15162.05	74555.3	35654.75	617.6	284904.95	-3225.54	-73010.35

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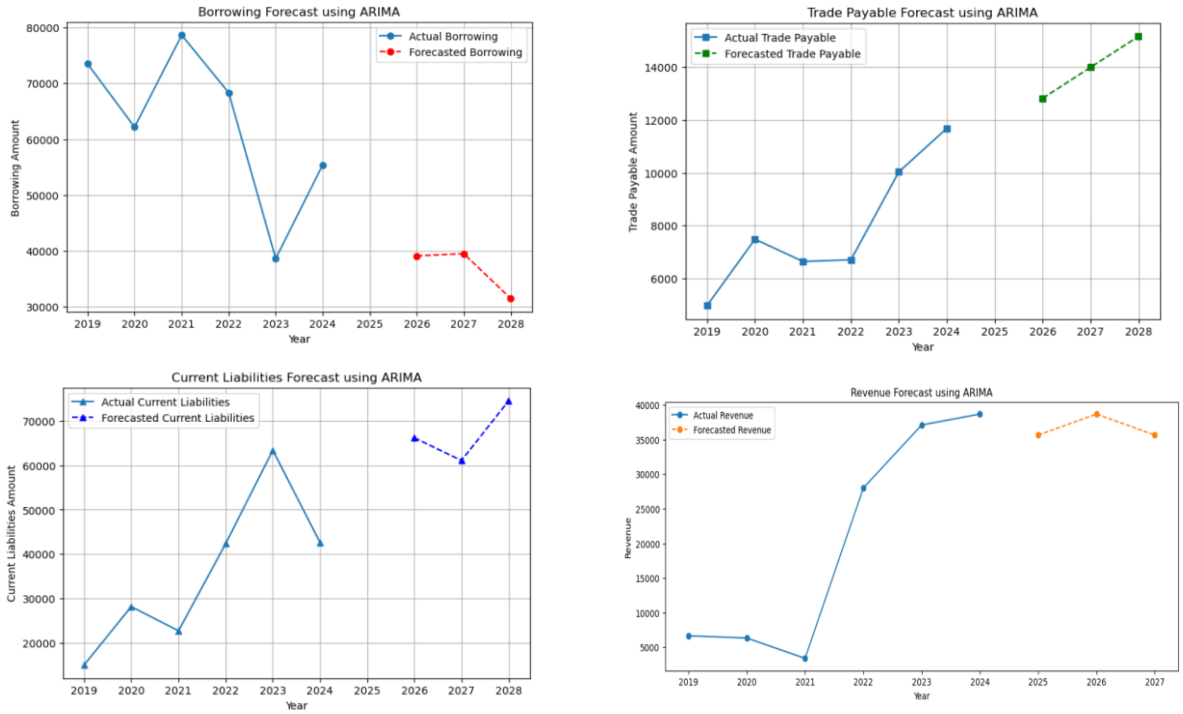
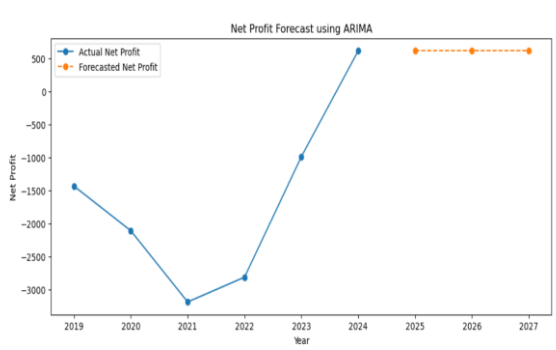
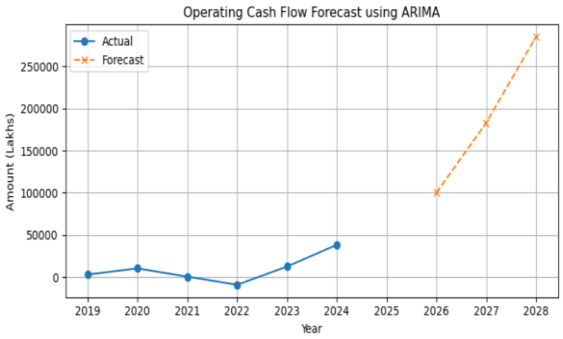
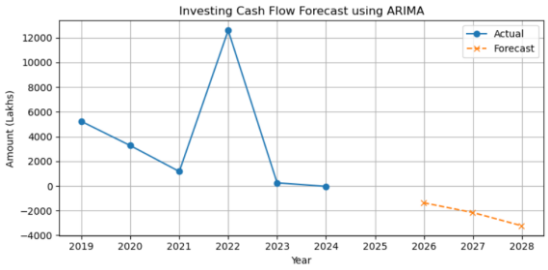
FIGURE: 1 ACTUAL VS FORECAST OF FINANCIAL PERFORMANCE USING ARIMA MODEL









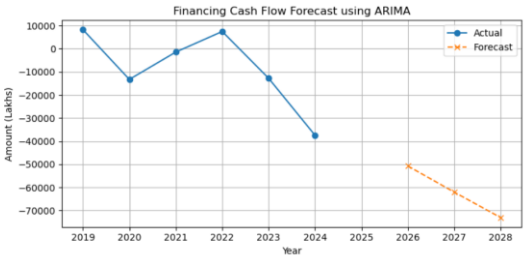


TABLE:3 ACTUAL VS PREDICTED VALUES ACROSS FORECASTING MODELS

ARIMA Forecasts

Year	Borrowing	Trade Payable	Current Liabilities	Revenue	Net Profit	CF from Operating	CF from Investing	CF from Financing
2025	39111.87	12817.11	66217.14	35654.35	617.6	100022.24	-1369.7	-50705.75
2026	39506.39	13990.89	61101.09	38684.5	617.6	182888.37	-2153.22	-62023.35
2027	31477.68	15162.05	74555.3	35654.75	617.6	284904.95	-3225.54	-73010.35

SARIMA Forecasts

Year	Borrowing	Trade Payable	Current Liabilities	Revenue	Net Profit	CF from Operating	CF from Investing	CF from Financing
2025	-27825.29	11499.96	98175.65	38822.17	1092.33	28468.43	3341.26	-16696.65
2026	25943.37	12173.07	51339.61	54512.64	1561.84	14771.37	6280.48	-7440.95
2027	-116505.11	14923.31	123998.65	60400.75	1728.94	35053.17	2078.73	-28049.53

Exponential Smoothing Forecasts

Year	Borrowing	Trade Payable	Current Liabilities	Revenue	Net Profit	CF from Operating	CF from Investing	CF from Financing
2025	45475.98	12208.45	61562.39	42649.52	2231.59	45514.83	1999.28	-50457.8
2026	41219.13	13445.47	67629.53	46600.1	3844.55	52804.39	1368.72	-63541.52
2027	36962.28	14682.5	73696.66	50550.68	5457.5	60093.95	738.16	-76625.24

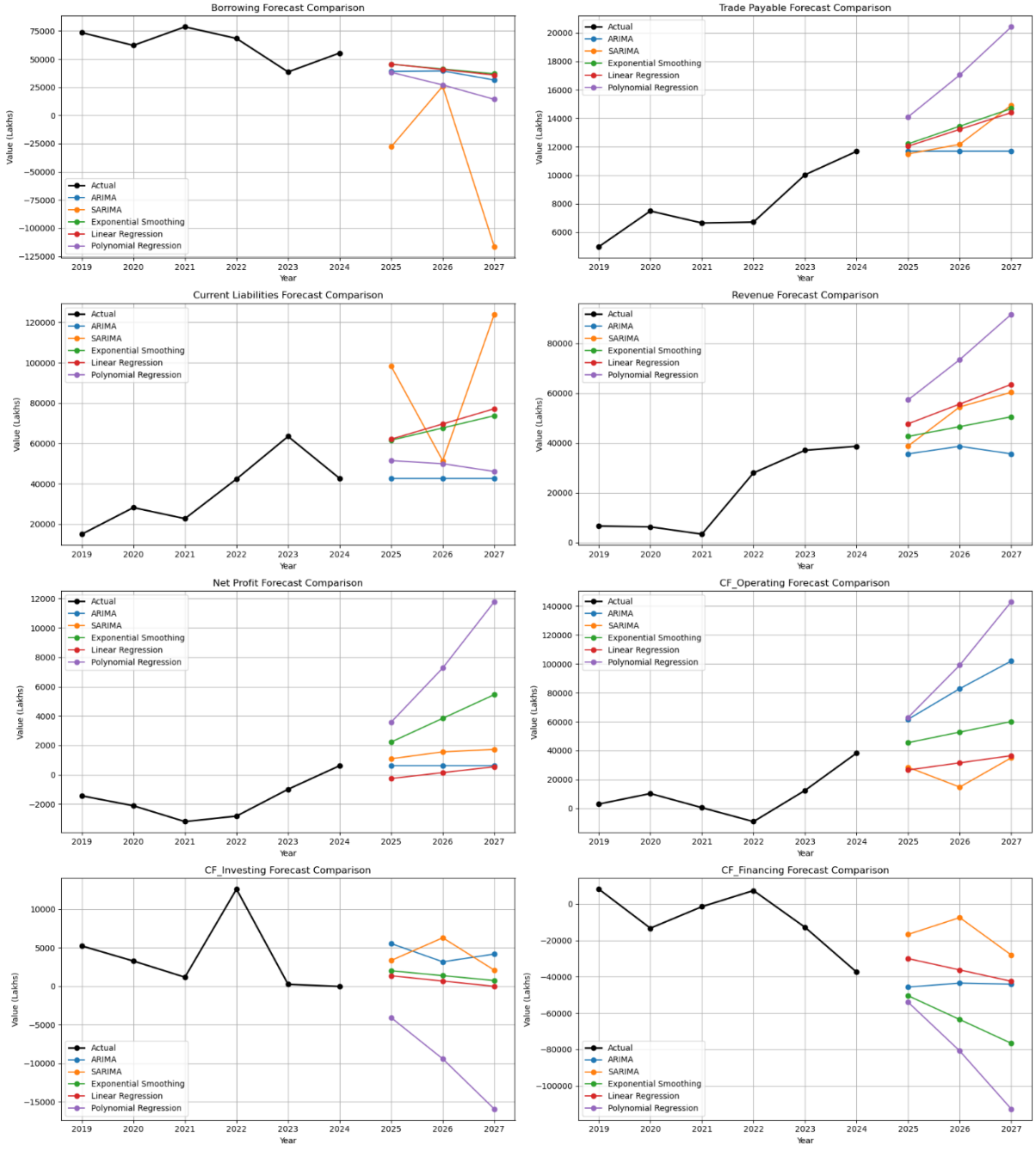
Linear Regression Forecasts

Year	Borrowing	Trade Payable	Current Liabilities	Revenue	Net Profit	CF from Operating	CF from Investing	CF from Financing
2025	45644.36	12044.21	62072.53	47737.64	-252.56	26593.39	1351.75	-30020.62
2026	40750.11	13222.03	69610.9	55654.63	147.14	31548.82	668.08	-36249.33
2027	35855.86	14399.85	77149.28	63571.62	546.83	36504.24	-15.59	-42478.04

Polynomial Regression Forecasts

Year	Borrowing	Trade Payable	Current Liabilities	Revenue	Net Profit	CF from Operating	CF from Investing	CF from Financing
2025	38282.84	14101.9	51454.98	57349.16	3584.82	62974.07	-4084.52	-54028.64
2026	27078.71	17043.46	49892.61	73504.59	7273.7	99112.94	-9427.86	-80835.66
2027	14297.11	20425.95	46055.04	91719.64	11784.87	143047.66	-15936.11	-112787.2

FIGURE:2 ACTUAL VS PREDICTED VALUES ACROSS FORECASTING MODELS



INFERENCE

Across all financial variables, ARIMA consistently generates the most reliable, accurate, and near-to-actual forecasts. Although SARIMA was created for seasonal data, it performs poorly in this case, most likely because the data lacks significant seasonality. Linear regression and exponential smoothing both have inconsistent but average results. Unrealistic projections and overfitting are typical issues with polynomial regression.

8. SUMMARY OF FINDINGS

- Borrowings are forecasted to decline from ₹55,408.82 lakhs in 2024 to ₹31,477.68 lakhs in 2027.

Trade

- Payables show a consistent increase from ₹11,679.79 lakhs to ₹15,162.05 lakhs by 2027. Current Liabilities fluctuate but expected to increase significantly to ₹74,555.30 lakhs in 2027.
- Revenue has increased from ₹3,393.46 lakhs in 2021 to ₹38,684.91 lakhs in 2024, with a stable forecast of ₹35,654 to ₹38,684 lakhs through 2027. Net Profit, after years of losses, turned positive in 2024 and remains stable at ₹617.60 lakhs in predicted years.
- Operating cash flow increases from ₹38,318.40 lakhs in 2024 to ₹284,904.95 lakhs by 2027. Investing cash flow and Financing cash flow turns increasingly negative.
- The SARIMA forecast shows significant fluctuations in borrowing. Trade payables and Current liabilities rise steadily, with current liabilities reaching ₹123,998.65 lakhs by 2027. Revenue grows from ₹38,822.17 to ₹60,400.75 lakhs in 2027, while net profit increases from ₹1,092.33 lakhs to ₹1,728.94 lakhs. Operating cash flow remains strong, but Financing activities remain negative, peaking at ₹-28,049.53 lakhs in 2027.
- The Exponential Smoothing projection shows a decrease in borrowings to ₹36,962.28 lakhs, while trade payables and liabilities increase. Revenue grows to ₹50,550.7 lakhs and net profit to ₹5,457.50 lakhs by 2027. Operating cash flow strengthens, but investing and financing cash flows trend downward, with financing hitting ₹-76,625.24 lakhs, indicating rising financial pressure.
- The Linear Regression shows a Borrowings decline to ₹35,855.86 lakhs, while trade payables and current liabilities rise to ₹77,149.28 lakhs. Revenue grows to ₹63,571.62 lakhs, and net profit turns positive at ₹546.83 lakhs by 2027. Operating cash flow increases, while investing and financing cash flows become negative, indicating repayment pressure and reduced capital inflow.
- The Polynomial Regression shows a Borrowings decreasing to ₹14,297.11 lakhs, while trade payables and liabilities remain high. Revenue rises sharply to ₹91,719.64 lakhs and net profit to ₹11,784.87 lakhs by 2027. Operating cash flow strengthens, but investing and financing cash flows turn highly negative, indicating potential liquidity pressure.

9. SUGGESTIONS

- Consider ARIMA the primary forecasting tool since it has repeatedly produced accurate and trustworthy predictions for a variety of financial variables.
- To detect and reduce any financial risks early on, include forecast insights based on ARIMA into the organization's risk management strategy.
- Keeping careful watch on borrowings and current liabilities since falling borrowings and increasing short-term liabilities point to a change in funding structure that may affect liquidity.
- Practices for managing cash flow should be strengthened, particularly in view of the anticipated rise in operational cash flow and the simultaneously declining trends in financing and investment cash flows.
- By monitoring notable deviations from predicted patterns, researchers can use ARIMA's forecasting ability to identify early indicators of financial instability.
- To maintain accuracy, periodically evaluate the forecasting models' relevance and, if necessary, look into more complex or hybrid models.
- To obtain a more comprehensive understanding of the company's credit risk and liquidity, include trade receivables in future forecasting initiatives.

- To ensure efficient reactions to possible risks and financial trends, management should be encouraged to incorporate forecast-based decision-making into strategic planning.

10. CONCLUSION

The study of SPR Construction Pvt. Ltd. shows the value of forecasting models in identifying financial risks. ARIMA produced the most accurate and consistent results out of all the models that were examined. It is best suited for forecasting future performance and closely matched real financial trends. Even though sales and profit are rising, liquidity may be impacted by the rise in trade payables and current liabilities. Additionally, the decline in cash flows from investments and financing suggests potential financial challenges.

Other models, such as exponential smoothing, SARIMA, and regression techniques, produced wildly inaccurate or inaccurate findings. This shows that ARIMA is the best model, especially for data that doesn't show seasonal trends. By using ARIMA forecasts for planning and risk management, SPR Construction Pvt. Ltd. would be able to identify early warning indicators and adapt to changes more effectively. This study offers helpful insights for enhancing financial decisions and ensuring long-term stability, despite its one-company focus and use of secondary data.

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