Proceedings of 7th International Conference of Economic, Business and Government Challenges 2024.
Vol. 7 No. 1 July 2024: 280-290

Developing a Predictive Model to Predict Cash Flow Using Time Series Analysis

Suci Dwilianti Tolla[1]*, Vicky Vendy[2]
Universitas Pembangunan Nasional Veteran Jawa Timur, Surabaya, Indonesia
21013010273@student.upnjatim.ac.id, vicky.vendy.ak@upnjatim.ac.id

Abstract. The main objective of this research is to provide accurate cash flow forecasts to support effective financial planning, risk management, and more informed decision making. This study aims to provide accurate predictions for future cash flows using annual data of PT Adaro Energy Tbk, PT Bukit Asam Tbk, and PT Bumi Resources Tbk from 2013 to 2022 based on the availability of existing data. The results showed that the ARIMA model was able to provide a fairly accurate cash flow forecast for the three companies. This prediction is expected to help companies optimize their performance, improve financial management, and create value for stakeholders. Therefore, the development of predictive models such as ARIMA becomes very important in supporting the financial stability and sustainability of company operations. Applying accurate cash flow forecasts helps companies overcome future business challenges and risks and increase overall company value. This research confirms that the use of ARIMA models in predicting cash flows not only improves the effectiveness of financial planning, but also plays a crucial role in sustainable and efficient business strategies. This provides valuable insights for company management in making better financial decisions and being responsive to market changes.
Keywords: Forecasting, ARIMA, Cash Flow

I. Introduction

The growth and success of a company are not only determined by operational performance, but also by the ability of financial management to manage cash flow. Stable and predictable cash flow is key to maintaining business continuity and making the right strategic decisions. Cash flow is important for predicting future cash flow because it provides direct information about the company's cash inflows and outflows. This information is very important for stakeholders, such as investors and creditors, to evaluate the company's financial health and make better investment decisions. The ability of cash flow to predict future cash flow also helps stakeholders in long-term financial planning, investment decision making, and managing the company's liquidity ((Pangestu, 2020).

According to research conducted by Fadly Bahrun et al., (2020) stable and predictable cash flow plays a crucial role in managing the sustainability and growth of a company. Having clear visibility into cash inflows and outflows, management can plan day-to-day operations more efficiently and effectively. Well-documented cash flow not only helps in meeting current financial obligations but also allows companies to anticipate and adapt to changes in market conditions that may occur in the future. Stakeholders, such as investors and creditors, rely heavily on cash flow information to assess the financial health of a company. Predictable cash flow provides a more accurate picture of short-term and long-term financial performance, which is the basis for better investment decision making. This information not only strengthens investor confidence in the company but also allows management to better explain their financial strategy to stakeholders (Mafsud & Meirini, 2023).

Utilizing the right forecasting tools and techniques is essential for companies to plan resource usage more intelligently, minimize liquidity risk, and optimize strategic decisions such as market expansion or investment in product innovation. Predictable cash flow is not only about current financial management, but also the foundation for sustainable growth and long-term success in a dynamic business environment. Effective cash flow management also reflects the quality of a company's overall financial management. With a strong focus on cash flow forecasting, companies can reduce financial risk, optimize capital structure, and create significant added value for all stakeholders. This illustrates how important stable and predictable cash flow is in supporting a company's strategic objectives and ensuring operational sustainability amidst changing global economic challenges. Stable and predictable cash flow is not only a solid financial foundation for a company, but also the key to optimizing company value and maintaining stakeholder trust in a competitive global market (Juliani & Muslihat, 2021).

Time series refers to a sequence of data points or observations recorded at regular time intervals, which may be daily, weekly, monthly, yearly, and so on. Analysis time series. This involves the study of patterns, trends, and behavior in data to make predictions or gain insights. This analysis is widely used in various fields such as economics, finance, weather forecasting, and signal processing (Hays, 2021). For example, Jamii & Maaroufi (2021) conducted a study on forecasting electricity consumption in Morocco until 2030 and showed an increasing trend in energy consumption, with an estimated increase of almost

34.54% by 2030. Singh et al., (2020) conducted a study to predict COVID-19 trends in the future. Meanwhile, the model Autoregressive Integrated Moving Average (ARIMA) is a powerful statistical method used to forecast data. This model is a combination of three components: autoregressive (AR), integrated, and moving average (MA). AR components refer to regression time series against its past values. Integrated components are used to create data time series that become stationary by differentiating, and the MA component represents the dependence between observations and residual errors of the moving average model (Surendra et al., 2021).

Several researchers have applied the analysis time series using the ARIMA technique. Research conducted by Vitriyah et al., (2023) conducted an ARIMA analysis on egg production at PT Satwa Indo Perkasa in Indonesia, which aimed to predict egg production for the next 3 months and found that forecasting using the ARIMA method was relevant and production data was stationary at the first difference level. In addition, Ayu et al., (2023) who applied the ARIMA method to forecast the number of new students at a certain private Islamic school, achieved very accurate short-term predictions by combining the method Autoregressive (AR) and Moving Average (MA). The ARIMA model is still considered efficient in predicting inflation with a value of Root Mean Squared Error (Low RMSE indicates a good level of model efficiency. Research with this ARIMA model can provide a significant contribution to the development of a company's financial strategy, assist management in making better decisions, and increase competitiveness and prepare for price and demand fluctuations in the market, thereby increasing the company's resilience to market changes (Ramadhani et al., 2020).

The mining industry has its unique characteristics, characterized by large-scale investments, complex risks, and significant uncertainty in external factors affecting financial performance. Therefore, the ability to accurately forecast cash flows is not only a necessity, but also a key element of a sustainable business strategy. Coal, as the main energy source for power generation and industry, faces unique challenges, including significant price fluctuations, changing environmental policies, and intense global competition. Therefore, the ability of coal mining companies to accurately forecast cash flows is not only a smart business strategy, but also an urgent need in the face of growing uncertainty and risk.

This study aims to provide accurate predictions for future cash flows using annual data from 2013 to 2022 based on the availability of existing data. PT Adaro Energy Tbk, PT Bukit Asam Tbk, and PT Bumi Resources Tbk are public companies engaged in coal mining in Indonesia, operating in an industry that is highly influenced by commodity price fluctuations and other external factors. Therefore, accurate cash flow predictions are very important for effective financial planning, risk management, and proper decision making. Reports that include information about the company's revenue, profit, cash flow, and financial position, can be used by investors, financial analysts, and other stakeholders to make better investment decisions. These financial reports can provide an overview of the company's financial performance during a certain period, by developing predictive models that can project future cash flows, it is hoped that the three companies can improve their financial management, optimize business performance, and increase the overall value of the company.

II. Literature Review

Cash flow

Cash flow forecasting is not only important for understanding a company's current finances, but also to capture rapidly changing market dynamics and take appropriate steps to manage future risks and opportunities. Having better visibility into expected cash flows, companies can make more informed decisions about resource allocation, including investment in new product development, market expansion, or operational infrastructure improvements. In addition, accurate cash flow forecasting allows companies to maintain a healthy financial balance. Knowing when and how much cash is coming in and out can help financial management better manage liquidity, avoid disruptive cash shortages, and minimize unnecessary borrowing costs. It also helps in planning debt payments and managing relationships with creditors, strengthening the company's negotiating position (Susetyo & Suryana, 2023).

Another important aspect of cash flow forecasting is its ability to provide companies with the insights they need to deal with changing economic and market conditions. With a deeper understanding of cash flow trends, companies can design appropriate adaptation strategies to deal with unexpected external changes (Juliani & Muslihat, 2021). In a broader strategic context, cash flow forecasting helps companies optimize capital use and increase stakeholder value. Leveraging detailed cash flow data, companies can identify opportunities to improve operational efficiency, reduce capital costs, and allocate resources in a way that maximizes long-term investment returns. Thus, investing in the development of sophisticated cash flow

forecasting methods and a deep understanding of a company's financial dynamics is not only a necessity but also an important strategic step to ensure sustainable growth and long-term success in a competitive market (Karim, 2022).

Forecasting

Forecasting or forecasting is a critical process in business and financial management that enables companies to project future conditions based on historical data and relevant trend analysis. Forecasting is used to predict various important variables such as sales, revenue, cash flow, product demand, and operating costs. Through accurate forecasting, companies can identify growth opportunities, anticipate challenges, and plan strategic steps to achieve their long-term goals (Petropoulos et al., 2022).

One of the main goals of forecasting is to assist in strategic decision making. By having a good estimate of what might happen in the future, managers can make more informed and timely decisions. For example, accurate sales forecasting allows companies to adjust production, raw material procurement, and marketing strategies efficiently, which in turn can improve operational efficiency and reduce costs. Research conducted by Salsabilah et al. (2022) states that forecasting is also important in human resource management and operations. By predicting workforce needs, for example, companies can plan employee recruitment, training, and development in line with their projected business demands. In addition, in terms of operations, cash flow forecasting helps companies better manage liquidity, minimize the risk of cash shortages, and optimize capital use.

Forecasting or forecasting involves using current and historical information to predict future values. Data time series is commonly used in forecasting, which aims to identify patterns in historical values for future prediction. Although accurate forecasting is challenging, expected values, prediction intervals, percentiles, and full prediction distributions are output common forecasting. Forecasting can serve a variety of purposes, from predicting events such as equipment failure to informing decision-making processes by understanding key elements of a situation. Forecasting methods can vary and may involve univariate or multivariate approaches, considering relationships between variables and using techniques such as simulation or artificial neural networks when the functional form is unclear (Rama, 2024).

Previous Research

Several previous researchers have discussed the ARIMA method. Gunawan & Febrianti (2023) used the ARIMA method to predict the value of Ethereum, but the results were not satisfactory, producing a Mean Absolute Percentage Error (MAPE) of 51.94%. It is concluded that the ARIMA model is not suitable for predicting cryptocurrency values during economic shocks such as the pandemic COVID-19. This study suggests exploring more sophisticated models such as Autoregressive Fractionally Integrated Moving Average (AFRIMA) to improve forecasting accuracy in the cryptocurrency market.

Tak et al. (2021) discussed the use of ARIMA models to predict the evolution of cases and deaths of COVID-19 in India. Different ARIMA models were applied to forecast cumulative cases and deaths, with a continuous increase projected in both. The importance of real-time forecasting and continuous data collection for evidence-based decision making in managing the pandemic was highlighted. In addition, the limitations of ARIMA models in capturing non-linear dynamics were acknowledged, emphasizing the need for early preparedness based on forecasting. However, the results of this case study suggest that ARIMA models are considered suitable for predicting the evolution of cases and deaths of COVID-19 in India.

Zhu et al. (2022) conducted a study aimed at predicting the number of diabetes sufferers and estimating the economic burden in China using the ARIMA model. This study used data from 2000 to 2018 and found that the number of diabetes sufferers in China is predicted to increase in the future, with an estimated economic burden of $ 156-170 billion from 2020 to 2025.

Smith et al. (2023) conducted a study that discussed the use of interrupted time series analysis, specifically using ARIMA models, to evaluate the impact of large-scale health interventions. This study guides how to use ARIMA models, including model selection, checking model fit, and interpreting findings. This study concludes that ARIMA modeling is a useful tool for evaluating large-scale interventions when other approaches are not appropriate.

III. Research Method

The approach used in this study is a quantitative approach using ARIMA analysis and the data collected will be processed using Python. The quantitative approach involves the collection and analysis of

numerical data to understand and explain phenomena. This is characterized by the use of statistical and mathematical models to generalize results and make predictions (Balaka, 2022). This approach focuses on measuring and quantifying variables, hypothesis testing, and pattern determination through statistical analysis. Quantitative research is often conducted through surveys, experiments, or structured observations, and aims to provide objective and generalizable findings (Firmansyah et al., 2021).

The data needed to predict future cash flows at PT Adaro Energy Tbk, PT Bukit Asam Tbk, and PT Bumi Resources Tbk is historical cash flow data for 2013-2022. This data provides information about the company's cash inflows and outflows from mining operations, investments in mining assets, and financing activities related to the mining industry.

IV. Results and Discussion

Results

PT Adaro Energy Tbk, PT Bukit Asam Tbk, and PT Bumi Resources Tbk are companies that play an important role in the energy and mining sector in Indonesia. These three companies play an important role in the coal mining industry in Indonesia. They have strong business strategies, commitment to the environment, and social responsibility programs that support local communities. Adaro Energy, Bukit Asam, and Bumi Resources continue to innovate and contribute to the national economy while maintaining environmental sustainability. Listed on the Indonesia Stock Exchange (IDX), these three companies have shown strong financial performance with stable revenue growth.

Table 1. Company Cash Flow 2013-2022

Tahun	PT Adaro Energy Tbk	PT Bukit Asam Tbk	PT Bumi Resources Tbk
2013	$ 680.904	$ 3.178.235	$ 45.553.173
2014	$ 745.248	$ 3.819.407	$ 32.522.988
2015	$ 702.452	$ 2.907.257	$ 8.487.609
2016	$ 1.076.948	$ 3.353.558	$ 2.809.707
2017	$ 1.206.848	$ 3.168.397	$ 41.417.796
2018	$ 927.896	$ 5.844.811	$ 88.528.723
2019	$ 1.576.191	$ 4.756.801	$ 44.650.916
2020	$ 1.173.703	$ 4.340.947	$ 56.142.271
2021	$ 1.811.141	$ 4.394.195	$ 220.979.398
2022	$ 4.067.358	$ 7.030.343	$ 67.807.180

PT Adaro Energi Tbk

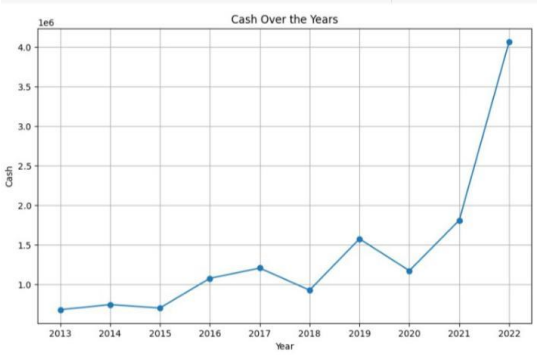

Figure 1. Cash Flow Plot 2013-2022

PT Bukit Asam Tbk

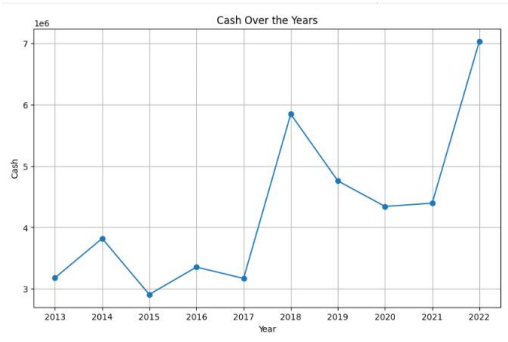

Figure 2. Cash Flow Plot 2013-2022

PT Bumi Resources Tbk

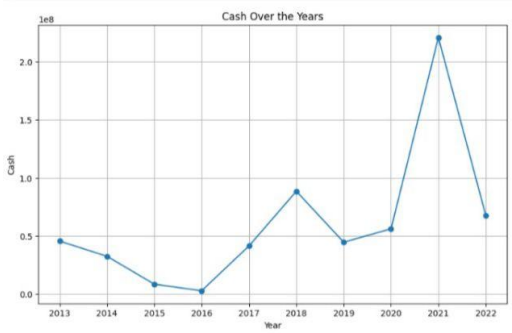

Figure 3. Cash Flow Plot 2013-2022

Table 2. Results of Stationarity Test After First Differencing :

Company	ADF Statistic	*p-value*	Hasil
PT Adaro Energi Tbk	0.5672927967035536	0.9867810853179496	Non-Stationery
PT Bukit Asam Tbk	-4.103863866200284	0.00095437908312425	Stationery
PT Bumi Resources Tbk	-1.6446800288544838	0.4415825352467454	Non-Stationery

Stationarity test is carried out using the Augmented Dickey-Fuller (ADF) test. The ADF test is used to test the null hypothesis that there is a unit root in time series data, which indicates that the data is not stationary. Data is considered stationary if the p-value resulting from the test is less than or equal to the specified level of significance. Cash flow data shows a trend with some fluctuations. The test results Augmented Dickey-Fuller (ADF) indicates that the data is not stationary (p-value>0.05), so it is done differencing. In the data, it was found that only PT Bukit Asam showed stationary results, while PT Adaro Energy and PT Bumi Resources showed non-stationary results. So it is necessary to do differencing once again to make the data stationary.

Differencing is one of the techniques used in time series analysis to make the data stationary, which is an important prerequisite for many time series models, including ARIMA. First differencing was performed to eliminate linear trends. If the data remains non-stationary after the first differencing, the second step is done to eliminate more complex trend components or remaining non-stationary patterns. After doing the first differencing, the data may still show trends or patterns that make it non-stationary. The ADF test (Augmented Dickey-Fuller) shows that the null hypothesis (data has a root unit and is non-stationary) cannot be rejected. Differencing both can help eliminate any remaining trend components.

Table 3. Results of Stationarity Test After Second Differencing:

Company	ADF Statistic	p-value	Hasil
PT Adaro Energi Tbk	0.2079472327018555	*0.972703824003653*	Non-Stationery
PT Bukit Asam Tbk	-4.103863866200284	*0.00095437908312425*	Stationery
PT Bumi Resources Tbk	-7.613889130382712	*2.217977821777241e-11*	Stationery

After doing a second differencing, PT Bumi Resources shows that it has value p-value which is much smaller than 0.05, which can be concluded that the results are very significant. Thus, we can reject the null hypothesis (H0) which states that the data has a root unit and conclude that the data is stationary after differencing. Secondly, it was found that PT Adaro still has a value p-value which is much greater than 0.05, indicating that the results are not significant. It can be concluded that the resulting value is not stationary.

If the data is not stationary after the second differencing, then you can do it third differencing. The third is the process of reducing data value. Time series with the previous value that has been differencing twice. This is an additional step taken when the data is still non-stationary after the first and second differencing, the third aims to eliminate any remaining nonstationary trend or pattern components after the second differencing.

Table 4. Results of Stationarity Test After Third Differencing:

Company	ADF Statistic	*p-value*	Hasil
PT Adaro Energi Tbk	-3.982692293145919	0.0015039008950107327	Stationery
PT Bukit Asam Tbk	-4.103863866200284	0.00095437908312425	Stationery
PT Bumi Resources Tbk	-7.613889130382712	2.217977821777241e-11	Stationery

Based on the test results Augmented Dickey-Fuller (ADF) has been provided for differencing. Third, the value that p-value generated by PT Adaro is less than 0.05, indicating that the results are significant at the 5% significance level. Thus, we reject the null hypothesis (H0) which states that the data has a root unit and conclude that the data is stationary after the third differencing.

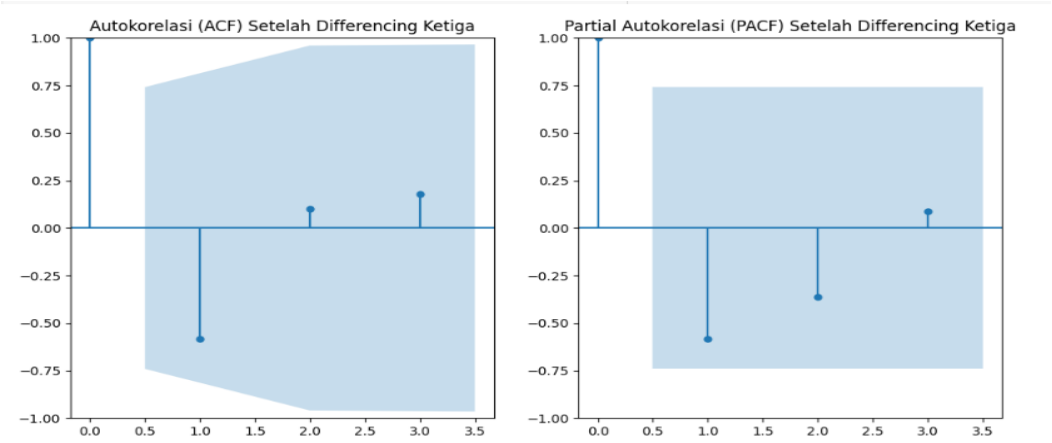

Figure 4. ACF and PACF plot of PT Adaro Energy Tbk

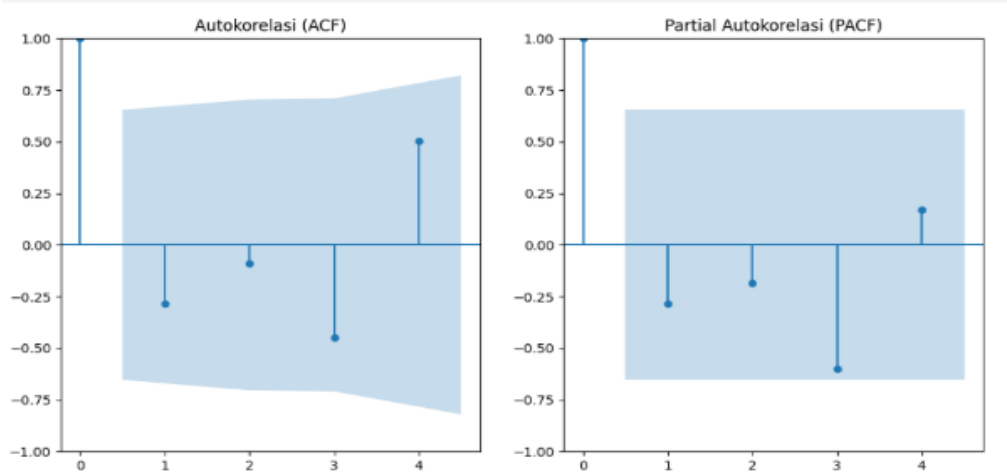

Figure 5. ACF and PACF plot of PT Bukit Asam Tbk

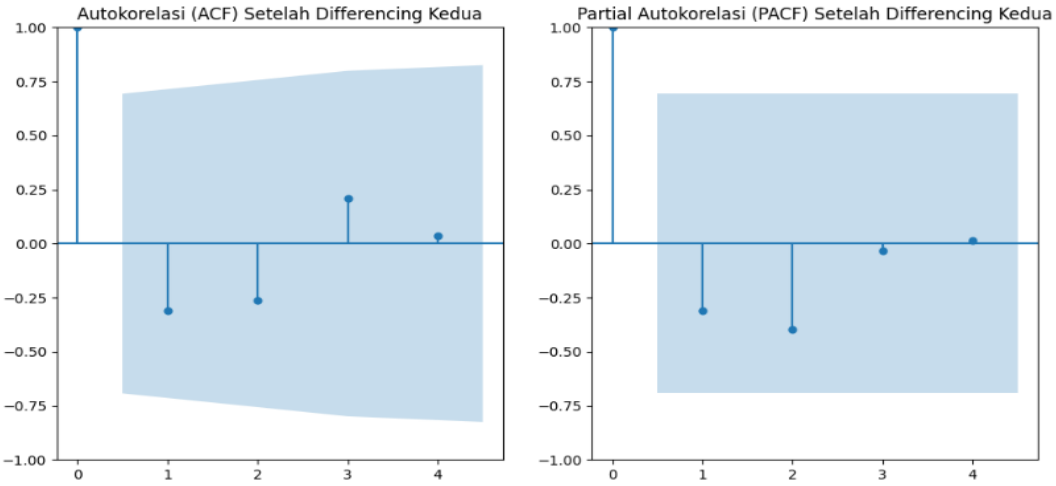

Figure 6. ACF and PACF plot of PT Bumi Resources Tbk

In the analysis time series, ACF is used to determine a suitable model, such as ARIMA (Auto Regressive Integrated Moving Average). Using ACF, we can identify the degree of differencing required to make the data stationary. This is important because the ARIMA model requires stationary data. ACF can help identify whether the data is stationary or not. For stationary data, the ACF value will decrease rapidly approaching zero, while for nonstationary data, the ACF value will decrease slowly or have a certain pattern. Plot the ACF and PACF after differentiating indicates that the data is stationary, and the initial parameters for the ARIMA model can be selected based on the plot.

Table 5. ARIMA Model

Perusahaan	Best Model	AIC
PT Adaro Energy Tbk	(1,1,2)	203.198
PT Bukit Asam Tbk	(1,1,2)	222.846
PT Bumi Resources Tbk	(1,1,2)	267.396

Determine the ARIMA model automatically using the auto arima (series,) script. trace=TRUE), the results are as follows: PT Adaro Energy, PT Bukit Asam Tbk, and PT Bumi Resources use the model (1, 1, 2). Furthermore, using the ARIMA (1,1,2) model, cash flow predictions are made for the next 5 years (2023-2027). The prediction results show a sharp downward trend in cash flow at the beginning of the prediction period, which is then followed by recovery and stabilization. The differences in these trends reflect external factors that affect each company's operations, such as commodity price fluctuations or global market conditions.

Table 6. Forecasting 5 Years Ahead

Tahun	PT Adaro Energy Tbk	PT Bukit Asam Tbk	PT Bumi Resources Tbk
2023	1.365.679	4.791.475	6.512.383
2024	1.266.790	4.475.045	5.062.854
2025	1.281.706	4.715.279	5.717.889
2026	1.276.812	4.532.893	5.421.882
2027	1.278.418	4.671.360	5.555.646

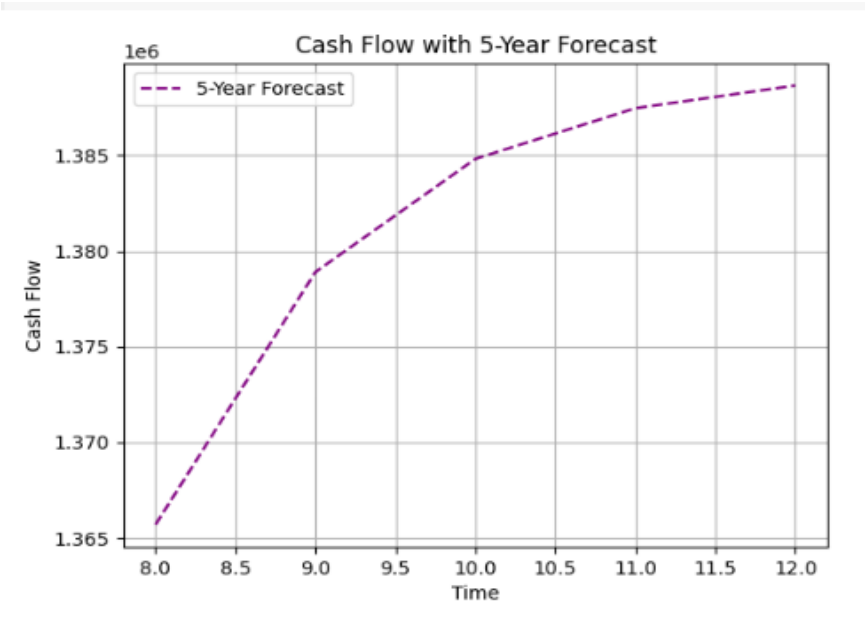

Figure 7. Plot Forecasting 5 Years Ahead PT Adaro Energy Tbk

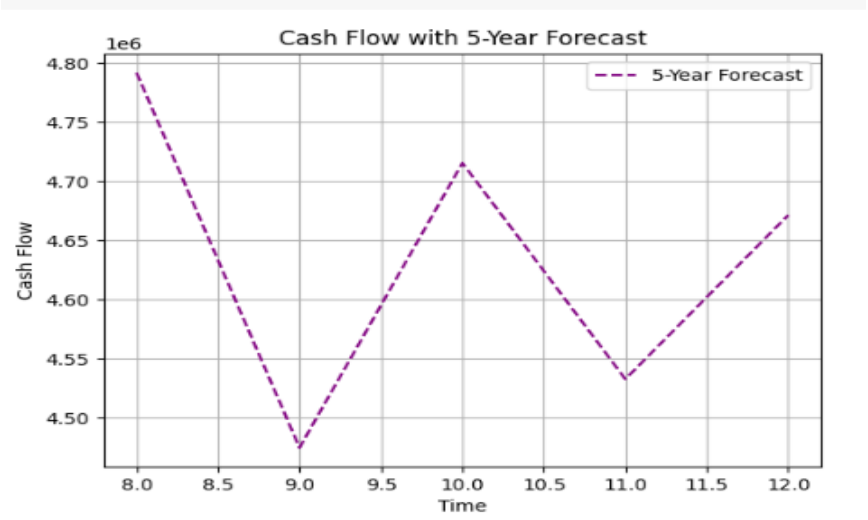

Figure 8. Plot Forecasting 5 Years Ahead PT Bukit Asam Tbk

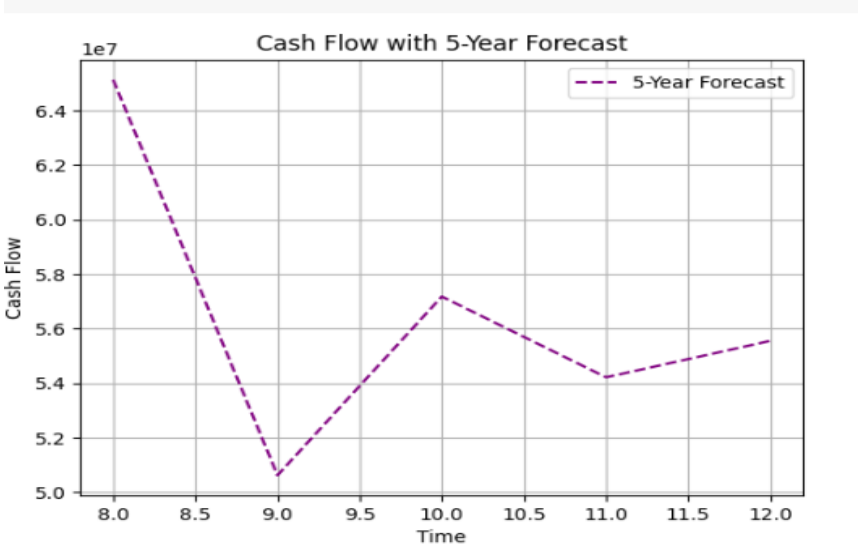

Figure 9. Plot Forecasting 5 Years Ahead PT Bumi Resources Tbk

Plot forecasting shows the cash flow forecast for the next 5 years based on the selected ARIMA model. All three plots show a sharp decline in cash flow at the beginning, followed by partial recovery and stabilization with small fluctuations. This pattern may indicate an external shock affecting the business, followed by efforts to recover and stabilize operations. The variability in the recovery rate and the level of fluctuations indicates differences in how each forecast may be affected by ongoing operations, external factors, or management actions.

Discussion

The hypothesis used in this study is the historical cash flow of PT Adaro Energy Tbk, PT Bukit Asam Tbk, and PT Bumi Resources Tbk in 2013-2022. The results of this study prove that the ARIMA model is effective in predicting future cash flow trends, but problems can occur in capturing nonlinear dynamics. ARIMA allows businesses to gain insight into their future financial situation, which helps strategic planning and decision making. Based on previous research conducted by Hassyddiqy & Hasdiana (2023) discussing the use of the ARIMA method to forecast sales and production at Huebee Indonesia. This study aims to improve production planning and increase productivity by accurately predicting future demand. This study states that effective forecasting supports the strategic decision-making process by providing a basis for appropriate action to achieve business goals. Utilizing forecasting techniques such as ARIMA, companies can simplify the decision-making process and remain competitive in a dynamic market.

Although the forecast results show a strong downward trend at the beginning of the forecast period followed by recovery and stabilization, these forecast results provide valuable information for the company in managing its financial risks. The limitations of the ARIMA model in capturing variations caused by complex external factors are also acknowledged in this study. For example, factors such as commodity price fluctuations, regulatory changes, and global market conditions can have a significant impact on a company's cash flows, which may not be fully captured by an ARIMA model.

Using ARIMA models to forecast cash flows or demand in companies, it is important to recognize that while ARIMA is effective in modeling trends and patterns in historical data, it has limitations in capturing more complex or non-linear dynamics. This study confirms that ARIMA provides a strong foundation for cash flow forecasting by taking into account initial downtrends followed by recovery and stabilization. This provides important insights for companies in financial planning and strategic decision making. However, as highlighted in the study, external factors such as commodity price fluctuations, regulatory changes, and global market conditions can have significant impacts on a company's cash flows that are not always fully captured by ARIMA models. This suggests the need for a more holistic approach to forecasting, considering the use of additional models or more sophisticated techniques that can capture more complex variations and dynamics.

It is important to note that the results of predictive models such as ARIMA are not static. Dynamic business environments demand continuous monitoring and periodic model updates. Companies need to adopt an adaptive approach to changing market conditions and the external environment to ensure that predictive models remain relevant and accurate. This includes collecting and analyzing up-to-date data and regularly evaluating the performance of predictive models. Therefore, while these models provide a good basis for forecasting, companies should consider using additional or more sophisticated models to improve forecast accuracy. Furthermore, the results of this study highlight the importance of regular monitoring and model updates. Dynamic market conditions and business environments require predictive models to be adjusted to remain relevant and accurate. Companies are encouraged to continuously collect and analyze up-to-date data and periodically evaluate the performance of their predictive models to ensure that they can respond appropriately to changing conditions and optimize financial performance.

V. Conclusion

This study successfully shows that the ARIMA (1,1,2) model is effective in predicting future cash flows for three major coal mining companies in Indonesia, namely PT Adaro Energy Tbk, PT Bukit Asam Tbk, and PT Bumi Resources Tbk. Analyzing historical data from 2013 to 2022, this study provides a clear picture of the future cash flow trend, which shows a sharp decline at the beginning of the prediction period followed by recovery and stabilization. This indicates that the ARIMA model is reliable in providing predictions that help companies in financial planning and strategic decision making.

Although the ARIMA model has proven its effectiveness, the study also acknowledges its limitations in capturing non-linear dynamics and fluctuations caused by complex external factors, such as commodity prices and global market conditions. To improve prediction accuracy, companies are advised to consider using additional or more sophisticated models that can capture more complex variability in their cash flow data. Thus, companies can better prepare themselves for uncertainty and changing market conditions.

Overall, this study confirms the importance of accurate cash flow prediction for business continuity and corporate financial management. Using the ARIMA model as a tool in cash flow analysis and prediction, companies can optimize their financial performance, better manage risks, and increase corporate value in the global market. This study provides a solid foundation for companies in the coal mining industry to continue to improve their prediction capabilities and face future challenges with more confidence. The authors' suggestion for further research is to prepare more complete financial reports, such as income statements, cash flow, and financial position to be able to find out more accurate forecasts. In addition, more analysis can be conducted using correlation and regression analysis to identify the relationship between cash flow prediction accuracy and financial health indicators such as profitability, solvency, and liquidity.

References

Ayu, D., Rm, P., & Adhar, D. (2023). Penerapan Metode Autoregressive Integrated Moving Average (ARIMA) Untuk Prediksi Jumlah Siswa Baru Pada MTs Swasta Tahfidzul Qur'an Nurul Azmi. *Jurnal Rekayasa Sistem*, *1*(1), 82. http://kti.potensi-utama.ac.id/index.php/JUREKSI/index%7C

Balaka, M. Y. (2022). Metode penelitian Kuantitatif. *Metodologi Penelitian Pendidikan Kualitatif*, *1*, 130.

Ekonomi, J., Teori, S., & Rama, A. (2024). *Predicting Shariah Stock Market Indices with Machine Learning : A Cross-Country Case Study Prediksi Indeks Pasar Modal Syariah dengan Machine Learning : Studi Kasus Antar Negara Khairunnisa et al / Jurnal Ekonomi Syariah Teori dan Terapan*. *11*(1), 86–104. https://doi.org/10.20473/vol11iss20241pp86-104.Predicting

Fadly Bahrun, M., Tifah, T., & Firmansyah, A. (2020). Pengaruh Keputusan Pendanaan, Keputusan Investasi, Kebijakan Dividen, Dan Arus Kas Bebas Terhadap Nilai Perusahaan. *Jurnal Ilmiah Akuntansi Kesatuan*, *8*(3), 263–276. https://doi.org/10.37641/jiakes.v8i3.358

Firmansyah, M., Masrun, M., & Yudha S, I. D. K. (2021). Esensi Perbedaan Metode Kualitatif Dan Kuantitatif. *Elastisitas - Jurnal Ekonomi Pembangunan*, *3*(2), 156–159. https://doi.org/10.29303/e-jep.v3i2.46

Gunawan, D., & Febrianti, I. (2023). Ethereum Value Forecasting Model using Autoregressive Integrated Moving Average (ARIMA). *International Journal of Advances in Social Sciences and Humanities*, *2*(1), 29–35. https://doi.org/10.56225/ijassh.v2i1.151

Hassyddiqy, H., & Hasdiana, H. (2023). Analisis Peramalan (Forecasting) Penjualan Dengan Metode ARIMA (Autoregressive Integrated Moving Average) Pada Huebee Indonesia. *Data Sciences Indonesia (DSI)*, *2*(2), 92–100. https://doi.org/10.47709/dsi.v2i2.2022

Hays, J. C. (2021). *Deterministic and Stochastic Trends Spurious Regressions Dickey-Fuller Tests Univariate Decompositions Time Series Analysis Models with Trends*.

Jamii, M., & Maaroufi, M. (2021). The Forecasting of Electrical Energy Consumption in Morocco with an Autoregressive Integrated Moving Average Approach. *Mathematical Problems in Engineering*, *2021*. https://doi.org/10.1155/2021/6623570

Juliani, R. H., & Muslihat, A. (2021). Influence of Profit and Cash Flow on Financial Distress Conditions. *Jurnal Ilmu Manajemen Profitability*, *5*(2), 327–339. https://doi.org/10.26618/profitability.v5i2.5905

Mafsud, M., & Meirini, D. (2023). Pengaruh Arus Kas Operasi, Arus Kas Investasi, Arus Kas Pendanaan dan Laba Akuntansi terhadap Return Saham. *Jurnal Informatika Ekonomi Bisnis*, *5*, 581–588. https://doi.org/10.37034/infeb.v5i2.569

Nur Afni Karim. (2022). Analisis Pengelolaan Keuangan Kas Besar Di Unit CCO (Cash and Clearing Operation) Pada PT. Bank Mandiri (Persero) Tbk Area Manado. *CEMERLANG : Jurnal Manajemen Dan Ekonomi Bisnis*, *2*(4), 127–131. https://doi.org/10.55606/cemerlang.v2i4.508

Pangestu, M. (2020). Analisis Kemampuan Informasi Laba dan Arus Kas dalam Memprediksi Arus Kas Masa Depan. *Berkala Akuntansi Dan Keuangan Indonesia*, *5*(2), 132. https://doi.org/10.20473/baki.v5i2.21400

Petropoulos, F., Apiletti, D., Assimakopoulos, V., Babai, M. Z., Barrow, D. K., Ben Taieb, S., Bergmeir, C., Bessa, R. J., Bijak, J., Boylan, J. E., Browell, J., Carnevale, C., Castle, J. L., Cirillo, P., Clements, M. P., Cordeiro, C., Cyrino Oliveira, F. L., De Baets, S., Dokumentov, A., … Ziel, F. (2022). Forecasting: theory and practice. *International Journal of Forecasting*, *38*(3), 705–871. https://doi.org/10.1016/j.ijforecast.2021.11.001

Ramadhani, F., Sukiyono, K., & Suryanty, M. (2020). Forecasting of Paddy Grain and Rice's Price: An ARIMA (Autoregressive Integrated Moving Average) Model Application. *SOCA: Jurnal Sosial, Ekonomi Pertanian*, *14*(2), 224. https://doi.org/10.24843/soca.2020.v14.i02.p04

Salsabilah, F., Fahmi Setiawan, M., & Prasista Whardani, S. (2022). Faktor-Faktor Yang Mempengaruhi Perencanaan Sumber Daya Manusia: Lingkungan External, Keputusan-Keputusan Organisasional, Persediaan Karyawan (Literature Review Msdm). *Jurnal Ilmu Hukum, Humaniora Dan Politik*, *2*(2), 141–149. https://doi.org/10.38035/jihhp.v2i2.932

Singh, R. K., Rani, M., Bhagavathula, A. S., Sah, R., Rodriguez-Morales, A. J., Kalita, H., Nanda, C., Sharma, S., Sharma, Y. D., Rabaan, A. A., Rahmani, J., & Kumar, P. (2020). Prediction of the COVID-19 pandemic for the top 15 affected countries: Advanced autoregressive integrated moving average (ARIMA) model. *JMIR Public Health and Surveillance*, *6*(2), 1–10. https://doi.org/10.2196/19115

Smith, D. C., Thumm, E. B., Anderson, J., Kissler, K., Reed, S. M., Centi, S. M., Staley, A. W., Hernandez, T. L., & Barton, A. J. (2023). Sudden Shift to Telehealth in COVID-19: A Retrospective Cohort Study of Disparities in Use of Telehealth for Prenatal Care in a Large Midwifery Service. *Journal of Midwifery and Women's Health*, *8*, 1–12. https://doi.org/10.1111/jmwh.13601

Surendra, J., Rajyalakshmi, K., Apparao, B. V., Charankumar, G., & Dasore, A. (2021). Forecast and trend analysis of gold prices in India using auto regressive integrated moving average model. *Journal of Mathematical and Computational Science*, *11*(2), 1166–1175. https://doi.org/10.28919/jmcs/5250

Susetyo, D. P., & Suryana, A. (2023). *Original Script J . EMA 0103-112023*. *1*(3).

Tak, A., Dia, S., Dia, M., & Wehner, T. C. (2021). Indian COVID-19 Dynamics: Prediction Using

Autoregressive Integrated Moving Average Modelling. *Scripta Medica (Banja Luka)*, *52*(1), 6–14. https://doi.org/10.5937/SCRIPTAMED52-29893

Vitriyah, N. L., Agri, K., Lutfi, H., Wahyu, E., Indo, S., Pt, P., & Indo, S. (2023). *Autoregressive Integrated Moving Average (Arima) Analysis On Egg Production (Case Study of PT Satwa Indo Perkasa, Borong Pa' La' La Village, Pattalasang District, Gowa Regency, South Sulawesi Province)*. *6*(November), 1–6.

Zhu, D., Zhou, D., Li, N., & Han, B. (2022). Predicting Diabetes and Estimating Its Economic Burden in China Using Autoregressive Integrated Moving Average Model. *International Journal of Public Health*, *66*(January 2022), 1–8. https://doi.org/10.3389/ijph.2021.1604449