PT. TELEKOMUNIKASI SHARE PRICE PREDICTION ANALYSIS INDONESIA USING THE TRIPLE METHOD EXPONENTIAL

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Abstract

The capital market is one of the investment models that is currently growing so rapidly. The amount of interest in investing makes many people who experience losses, due to not understanding the investment risks. This requires technical analysis skills. In this research, we will analyze the prediction of PT. Telekomunikasi Indonesia (TLKM) from 2021 to 2022. The variables used in this study are historical prices ranging from Open, High, Low, and Close prices. The stages used are 184 historical data collection, where the data is taken through Google's financial database and yahoo Finance. Then the calculation process uses the Triple Exponential Smoothing method, the system accuracy process is calculated for the forecast error value using the Mean Absolute Percentage Error (MAPE).

1. INTRODUCTION

Today, stock investment has begun to be very popular with the public. Considering the easier access to financial technology that provides information and stock transactions, such as trading and investing applications (Istamaret all., 2019). Along with the development of the investment world, the general public began to recognize financial investment. People are starting to realize the importance of investing in the future. From year to year the number of Indonesian investors is increasing. The increase in the number of investors is due to the increasing public interest in investing.

LQ45 is an actively traded stock, and its price continues to fluctuate with the intensity of its trading. There are 45 most liquid stocks selected and shown to be the most active in selling their shares on the Indonesia Stock Exchange, one of which is PT. Telekomunikasi Indonesia (TLKM) (Fadilah, et all., 2020). The shares of companies listed on this index are the best stocks that have been selected with certain criteria in several periods and these stocks are also considered safe stocks to own, because of their fundamentals. stock performance is good. In terms of risk, the LQ45 stock group has the lowest risk compared to other stocks.

But on the other hand, millennials or new investors who are still beginners in the capital market have difficulty managing their stock portfolios such as when to sell, increase their investment capital, and when to buy shares. Errors in the process resulted in a loss of their capital (Jonnius. 2017). This is due to the lack of experience and knowledge they have. As a result, it is not uncommon to experience large losses because of the mistakes they made. However, losses are impossible to avoid, even for experienced investors.

2. LITERATURE REVIEW
Stock Price Movement Analysis

According to (Monika & Yusniar, 2020) technical analysis is an analysis that focuses on price movements and the number of transactions of a stock. Investors use several methods of analysis to determine buying and selling points. Each technical analysis has a different picture in

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determining trading on the exchange. Knowing the character of each stock is the best strategy to produce more accurate information

Triple Exponential Smoothing Method

      Triple exponential smoothing is a forecasting method that overcomes the differences that arise between the actual data and the forecast value if there is a trend in the plot. This method is used when the data shows trends and seasonal behavior. The seasonal component is often the most important factor to explain the variations in the dependent variable over a period of one year. This method is the result of the development of the single exponential smoothing and double exponential smoothing methods (Lieberty & Imbar 2015). The advantage of this method is that it can model the trend and level of a time series to be more efficient. Because it requires less data and relatively low ease of operation.

3. RESULTS AND DISCUSSION

      This stage will discuss in detail and detail the stages carried out in the process of implementing Triple Exponential Smoothing in predicting Forex price movements. The data used is historical data from PT. Telekomunikasi Indonesia (TLKM) starting from January 1 to October 1, 2022. Which will later be used as simulation data for the Triple Exponential Smoothing Implementation to predict data. The data taken comes from the web Google finance and yahoo finance.

Table 1. Stock Price Forecasting Results

Date	Price				Forecast			
	Open	*High*	*Low*	*Close*	f1	f2	f3	f4
01/09/2022	4,580	4,560	4,650	4,530	IDR 4,600.00	Rp 4,571.50	IDR 4,600.46	Rp 4,575.32
02/09/2022	4,600	4,540	4,620	4,540	IDR 4,620.00	Rp 4,575.90	Rp 4,589.41	Rp 4,568.62
05/09/2022	4,620	4,560	4,630	4.550	Rp 4,510.00	Rp 4,595.90	Rp 4,605.51	Rp 4,581.84
06/09/2022	4,510	4,610	4,620	4,510	IDR 4,490.00	Rp 4,548.30	Rp 4,580.69	Rp 4,561.46
07/09/2022	4,490	4,500	4,560	4,480	Rp 4,560.00	Rp 4,493.20	Rp 4,519.12	Rp 4,507.19
08/09/2022	4,560	4,500	4,640	4,500	IDR 4,600.00	Rp 4,535.90	Rp 4,572.81	Rp 4,545.94
09/09/2022	4,600	4.550	4,600	4,530	Rp 4,540.00	Rp 4,579.80	Rp 4,584.50	Rp 4,561.04
12/09/2022	4,540	4,600	4,600	4,530	Rp 4,520.00	Rp 4,562.70	Rp 4,579.65	Rp 4,564.77
13/09/2022	4,520	4,540	4,560	4,520	IDR 4,480.00	Rp 4,527.10	Rp 4,540.30	Rp 4,534.53
14/09/2022	4,480	4,490	4,530	4,460	IDR 4,5000.00	IDR 4,483.20	Rp 4,501.32	Rp 4,487.52
15/09/2022	4,500	4,540	4,600	4,500	IDR 4,410.00	Rp 4,514.90	Rp 4,549.47	Rp 4,536.03
16/09/2022	4,410	4,500	4,500	4,410	IDR 4,5000.00	IDR 4,444.40	IDR 4,470.00	IDR 4,453.60

Date	Open	High	Low	Close			
19/09/2022	4,500	4,460	4,560	4,440	IDR 4,480.00	IDR 4,483.70	Rp 4,510.79	Rp 4,484.35
20/09/2022	4,480	4,530	4,540	4,480	IDR 4,430.00	Rp 4,498.80	Rp 4,516.76	Rp 4,506.57
21/09/2022	4,430	4,450	4,470	4,410	IDR 4,430.00	Rp 4,437.10	IDR 4,450.30	Rp 4,436.73
22/09/2022	4,430	4,400	4,450	4,380	IDR 4,380.00	IDR 4,417.60	Rp 4,428.07	Rp 4,408.80
23/09/2022	4,380	4,400	4,430	4,380	IDR 4,460.00	IDR 4,387.10	IDR 4,404.20	Rp 4,397.41
26/09/2022	4,460	4,390	4,510	4,300	IDR 4,440.00	Rp 4,432.00	IDR 4,458.23	Rp 4,396.19
27/09/2022	4,440	4,450	4,470	4,380	IDR 4,470.00	IDR 4,443.20	IDR 4,453.52	Rp 4,426.15
28/09/2022	4,470	4,430	4,530	4,400	IDR 4,440.00	IDR 4,453.70	IDR 4,480.79	IDR 4,450.45
29/09/2022	4,440	4,460	4,500	4,420	IDR 4,460.00	Rp 4,447.10	IDR 4,468.10	IDR 4,452.50
30/09/2022	4,460	4,400	4,500	4,390	IDR 4,460.00	IDR 4,435.90	IDR 4,457.21	IDR 4,430.49

The results from table 1 above are price predictions from 4 stock price points such as the open price or the opening price, then the high price, the highest price that day, the lowest low price, and the closing closing price. In this study, the forecasting is done daily, where each forecasting result is used to predict tomorrow's movement.

Table 2. Mean Absolute Percentage Error (MAPE)

No	Date	Price average	Forest average	Difference	Percentage Accuracy (%)	MAPE (%)
1	01/09/2022	Rp 4,582.43	Rp 4,586.07	IDR (3.64)	99.92	0.08
2	02/09/2022	Rp 4,577.98	Rp 4,578.67	IDR (0.69)	99.98	0.02
3	05/09/2022	Rp 4,594.42	Rp 4,593.92	IDR 0.49	99.99	0.01
4	06/09/2022	Rp 4,563.48	Rp 4,568.55	IDR (5.06)	99.89	0.11
5	07/09/2022	Rp 4,506.50	Rp 4,510.94	IDR (4.43)	99.90	0.10
6	08/09/2022	Rp 4,551.55	Rp 4,556.77	Rp (5.22)	99.89	0.11
7	09/09/2022	Rp 4,575.11	Rp 4,573.55	Rp 1.56	99.97	0.03
8	12/09/2022	Rp 4,569.04	Rp 4,571.15	IDR (2.11)	99.95	0.05
9	13/09/2022	Rp 4,533.98	Rp 4,536.27	IDR (2.29)	99.95	0.05
10	14/09/2022	Rp 4,490.68	Rp 4,493.17	IDR (2.49)	99.94	0.06
11	15/09/2022	Rp 4,533.47	Rp 4,539.66	Rp (6.19)	99.86	0.14
12	16/09/2022	IDR 4,456.00	IDR 4,459.87	IDR (3.87)	99.91	0.09
13	19/09/2022	Rp 4,492.94	Rp 4,496.03	Rp (3.08)	99.93	0.07
14	20/09/2022	Rp 4,507.38	Rp 4,510.24	IDR (2.86)	99.94	0.06
15	21/09/2022	Rp 4,441.38	Rp 4,442.80	Rp (1.43)	99.97	0.03
16	22/09/2022	IDR 4,418.16	IDR 4,418.34	IDR (0.19)	100.00	0.00
17	23/09/2022	Rp 4,396.24	Rp 4,399.28	Rp (3.05)	99.93	0.07

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18	26/09/2022	IDR 4,428.80	IDR 4,427.74	Rp 1.06	99.98	0.02
19	27/09/2022	IDR 4,440.95	IDR 4,440.21	IDR 0.75	99.98	0.02
20	28/09/2022	Rp 4,461.64	Rp 4,464.29	IDR (2.65)	99.94	0.06
21	29/09/2022	IDR 4,455.90	IDR 4,458.83	IDR (2.93)	99.93	0.07
22	30/09/2022	IDR 4,441.20	IDR 4,442.97	IDR (1.77)	99.96	0.04
Average Percentage Accuracy					99.86	0.14

From the results above, we see that the average percentage of accuracy reaches 99.86% with processing data of around 184 share price data. It can be concluded that the Alpha 0.13 and Trend 0.87 parameters produce a fairly good level of accuracy. From the table above, the MAPE value for each date is obtained and the average MAPE value is 0.14%. So it can be concluded that the average error rate (MAPE) from the table above is low and if the error rate is low, the accuracy level is high.

4. CONCLUSION

Based on the results of stock forecasting PT. Telekomunikasi Indonesia (TLKM) using the Triple Exponential Smoothing method, produces an accuracy rate of 99.86% with a MAPE value of 0.14%. Alpha and beta values obtained are 0.13 and 0.87. With this system, it is expected to produce output in the form of predictions of TLKM stock price hangka within the next few months, so that it becomes one of the decision support factors for investors in analyzing stock price movements technically, so that later it will help reduce the risk of loss.

5. ACKNOWLEDGEMENT

REFERENCES

Altan, a., & karasu, s. (2019). The effect of kernel values in support vector machine to forecasting performance of financial time series. *The Journal of Cognitive Systems*, *4*(1), 17–21.

Asthri, D., Topowijono, T., & Sulasmiyati, S. (2016). Analisis Teknikal Dengan Indikator *Moving Average Convergence Divergence* Untuk Menentukan Sinyal Membeli Dan Menjual Dalam Perdagangan Saham (Studi Pada Perusahaan Sub Sekto Makanan Dan Minuman di Bei Tahun 2013-2015). Jurnal Administrasi Bisnis S1 Universitas Brawijaya, *33*(2), 41–48. https://doi.org/administrasibisnis.studentjournal.ub.ac.id.

Bustani, B., Khaddafi, M.., & Nur Ilham, R. (2022). Regional Financial Management System of Regency/City Regional Original Income In Aceh Province Period Year 2016-2020. *International Journal of Educational Review, Law And Social Sciences (IJERLAS)*, *2*(3), 459–468. https://doi.org/10.54443/ijerlas.v2i3.277.

Darnila, E., & Fikry, M. (2019). Aplikasi Peramalan Kurs Bitcoin-Rupiah Dengan Menggunakan Metode Double Exponential Smoothing. *TECHSI-Jurnal Teknik Informatika*, *11*(1), 114-124.

Fadilah, W. R. U., Agfiannisa, D., & Azhar, Y. (2020). Analisis Prediksi Harga Saham PT. Telekomunikasi Indonesia Menggunakan Metode Support Vector Machine. *Fountain Informatics J*, *5*(2), 45-51.

Falahuddin, F., Fuadi,. F., Munandar, M., Juanda, R.., & Nur Ilham, R.. (2022). Increasing Business Supporting Capacity in Msmes Business Group Tempe Bungong Nanggroe

Kerupuk In Syamtalira Aron District, Utara Aceh Regency. *Irpitage Journal*, *2*(2), 65–68. https://doi.org/10.54443/irpitage.v2i2.313.

Falani, I. (2018). Penentuan Nilai Parameter Metode *Exponential Smoothing* dengan Algoritma Genetik dalam Meningkatkan Akurasi *Forecasting*. *CESS (Journal of Computer Engineering, System and Science)*, *3*(1), 14-16.

Fitria, V., & Anwar, S. (2020). Penerapan Triple Exponential Smoothing dalam Meramalkan Laju Inflasi Bulanan Provinsi Aceh Tahun 2019-2020. *E-Jurnal Ekon. dan Bisnis Univ. Udayana*, *9*(1), 23-38.

Geovani, I.., Nurkhotijah, S.., Kurniawan, H.., Milanie, F., & Nur Ilham, R. (2021). Juridical Analysis of Victims of The Economic Exploitation of Children Under the Age to Realize Legal Protection from Human Rights Aspects: Research Study at The Office of Social and Community Empowerment in Batam City. *International Journal of Educational Review, Law and Social Sciences (IJERLAS)*, *1*(1), 45–52. https://doi.org/10.54443/ijerlas.v1i1.10

Ilham, Rico Nur. *et all* (2019). Comparative of the Supply Chain and Block Chains to Increase the Country Revenues via Virtual Tax Transactions and Replacing Future of Money. International Journal of Suplly Management.Volume 8 No.5 August 2019.

Ilham, Rico Nur. *et all* (2019). Investigation of the Bitcoin Effects on the Country Revenues via Virtual Tax Transactions for Purchasing Management. International Journal of Suplly Management.Volume 8 No.6 December 2019.

Istamar, Sarfiah, S. N., & Rusmijati,. (2019). Analisis pengaruh harga minyak dunia, harga emas, dan nilai kurs rupiah terhadap indeks harga saham gabungan di bursa efek indonesia tahun 1998-2018. *Dinamic: Directory Journal of Economic*, *1*(4), 433–442. https://doi.org/10.31002/DINAMIC.V1I4.805

Jayanti, N. K. D. A. (2015). Penerapan Metode Triple Exponential Smoothing pada Sistem Peramalan Penentuan Stok Obat. *Jurnal Sistem dan Informatika (JSI)*, *9*(2), 13-23.

Jonnius. (2017). *Peramalan Indeks Harga Saham dengan Pendekatan Exponential Smoothing Model*. Jurnal Penelitian Sosial Keagamaan, *19*(2), 199–219.

Khairawati, K., Fuadi, W., Ramadhansyah, R., & Fariadi, D. (2021). GOLD PRICESFORECASTING USING TRIPLE EXPONENTIAL METHOD. *International Journal of Economic, Business, Accounting, Agriculture Management and Sharia Administration (IJEBAS)*, *1*(2), 269-276.

Lasta Irawan, A. ., Briggs, D. ., Muhammad Azami, T. ., & Nurfaliza, N. (2021). The Effect of Position Promotion on Employee Satisfaction With Compensation As Intervening Variables: (Case Study on Harvesting Employees of PT. Karya Hevea Indonesia). International Journal of Social Science, Educational, Economics, Agriculture Research, and Technology (IJSET), 1(1), 11–20. https://doi.org/10.54443/ijset.v1i1.2

Lieberty, A., & Imbar, R. V. (2015). Sistem Informasi Meramalkan Penjualan Barang Dengan Metode Double Exponential Smoothing (Studi kasus: PD. Padalarang Jaya). Jurnal Teknik Informatika dan Sistem Informasi, 1(1), 27-32.

Likdanawati, likdanawati, Yanita, Y., Hamdiah, H., Nur Ilham, R., & Sinta, I. (2022). Effect of Organizational Commitment, Work Motivation And Leadership Style on Employee Performance of Pt. Aceh Distribus Indo Raya. International Journal of Social Science, Educational, Economics, Agriculture Research, and Technology (IJSET), 1(8), 377–382. https://doi.org/10.54443/ijset.v1i8.41.

Majied Sumatrani Saragih, M.., Hikmah Saragih, U.., & Nur Ilham, R. (2021). Relationship Between Motivation and Extrinsic Motivation to Icreasing Entrepreneurship Implementation from Spp Al-Falah Group at Blok 10 Village Dolok Masihul. *Morfai Journal*, *1*(1), 1–12. https://doi.org/10.54443/morfai.v1i1.11.

Monika, N. E., & Yusniar, M. W. (2020). *Analisis Teknikal Menggunakan Indikator MACD dan RSI pada Saham JII*. Jurnal Riset Inspirasi Manajemen Dan Kewirausahaan, *4*(1), 1–8. https://doi.org/10.35130/jrimk.v4i1.76.

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Nur Ilham, R.., Arliansyah, A., Juanda, R., Multazam, M.., & Saifanur, A... (2021). Relathionsip Between Money Velocity and Inflation to Increasing Stock Investment Return: Effective Strategic by Jakarta Automated Trading System Next Generation (Jats-Ng) Platform. *International Journal of Economic, Business, Accounting, Agriculture Management and Sharia Administration (IJEBAS)*, *1*(1), 87–92. https://doi.org/10.54443/ijebas.v1i1.27

Nur Ilham, R., Heikal, M.., Khaddafi, M.., F, F., Ichsan, I., F, F., Abbas, D.., Fauzul Hakim Hasibuan, A.., Munandar, M., & Chalirafi, C. (2021). Survey of Leading Commodities of Aceh Province as Academic Effort to Join and Build the Country. *Irpitage Journal*, *1*(1), 13–18. https://doi.org/10.54443/irpitage.v1i1.19

Nur ilham, R., Likdanawati, L., Hamdiah, H., Adnan, A., & Sinta, I. (2022). Community Service Activities "Socialization Avoid Study Investment" to The Student Bond of Serdang Bedagai. *Irpitage Journal*, *2*(2), 61–64. https://doi.org/10.54443/irpitage.v2i2.312

Rahmaniar, R., Subhan, S., Saharuddin, S., Nur Ilham, R. ., & Anwar, K. . (2022). The Influence of Entrepreneurship Aspects on The Success of The Chips Industry In Matang Glumpang Dua and Panton Labu. International Journal of Social Science, Educational, Economics, Agriculture Research, and Technology (IJSET), 1(7), 337–348. https://doi.org/10.54443/ijset.v1i7.36

Sandi, H.., Afni Yunita, N.., Heikal, M.., Nur Ilham, R.., & Sinta, I. (2021). Relationship Between Budget Participation, Job Characteristics, Emotional Intelligence and Work Motivation as Mediator Variables to Strengthening User Power Performance: An Emperical Evidence from Indonesia Government. *Morfai Journal*, *1*(1), 36–48. https://doi.org/10.54443/morfai.v1i1.14

Sinta, I.., Nur Ilham, R., Kumala Sari, D.., M, M., Khaidir, K., & Ekamaida, E. (2021). Training The Processing of Tomato Sauce for A Home-Based Business the Scale of SMES. *Irpitage Journal*, *1*(1), 26–28. https://doi.org/10.54443/irpitage.v1i1.24

Sinurat, M.., Heikal, M.., Simanjuntak, A.., Siahaan, R.., & Nur Ilham, R. (2021). Product Quality on Consumer Purchase Interest with Customer Satisfaction as A Variable Intervening in Black Online Store High Click Market: Case Study on Customers of the Tebing Tinggi Black Market Online Store. *Morfai Journal*, *1*(1), 13–21. https://doi.org/10.54443/morfai.v1i1.12.

Yulia. (2016). *Analisis Pengaruh Rasio Likuiditas Terhadap Return Saham (Studi Pada Perusahaan Indeks LQ45 yang Terdaftar Di Bursa Efek Indonesia)*. Jurnal Khatulistiwa Informatika, *IV* (2), 192–204

Yusuf Iis, E., Wahyuddin, W., Thoyib, A., Nur Ilham, R., & Sinta, I. (2022). The Effect of Career Development and Work Environment On Employee Performance With Work Motivation As Intervening Variable At The Office Of Agriculture And Livestock In Aceh. *International Journal of Economic, Business, Accounting, Agriculture Management and Sharia Administration (IJEBAS)*, *2*(2), 227–236. https://doi.org/10.54443/ijebas.v2i2.191