

BAB 5

KESIMPULAN DAN SARAN

5.1. Kesimpulan

Penelitian ini mengusulkan sebuah framework baru yang menggunakan metode Association Rule, peramalan ARIMA, dan tampilan dashboard yang saling terintegrasi untuk menganalisis pola perilaku konsumen, sehingga menghasilkan keputusan dalam pengadaan barang yang efektif dan efisien. Hasil penelitian menunjukkan bahwa framework ini memberikan pemahaman yang lebih baik terhadap perilaku pembelian dan preferensi pelanggan, serta memberikan informasi yang dapat membantu dalam membuat keputusan manajemen perusahaan.

Penggunaan analisis dengan algoritma Association Rule mengungkapkan pola signifikan terhadap produk-produk tertentu, seperti hubungan antara item Slate & Black Lava, Sukabumi Green & Black Andesite, Classic White & Palimanan Yellow, dan Sukabumi Green & Palimanan Yellow. Informasi ini memungkinkan perusahaan untuk mengoptimalkan strategi manajemen persediaan dan pemasaran berdasarkan permintaan konsumen yang teridentifikasi.

Metode peramalan ARIMA dalam framework ini memberikan hasil yang cukup akurat untuk meramalkan jumlah permintaan produk di masa depan, meskipun terdapat beberapa perbedaan antara data aktual dan hasil peramalan, terutama pada item yang memiliki asosiasi kuat dengan item lain. Peramalan ini penting untuk perencanaan produksi yang efisien dan manajemen persediaan yang tepat.

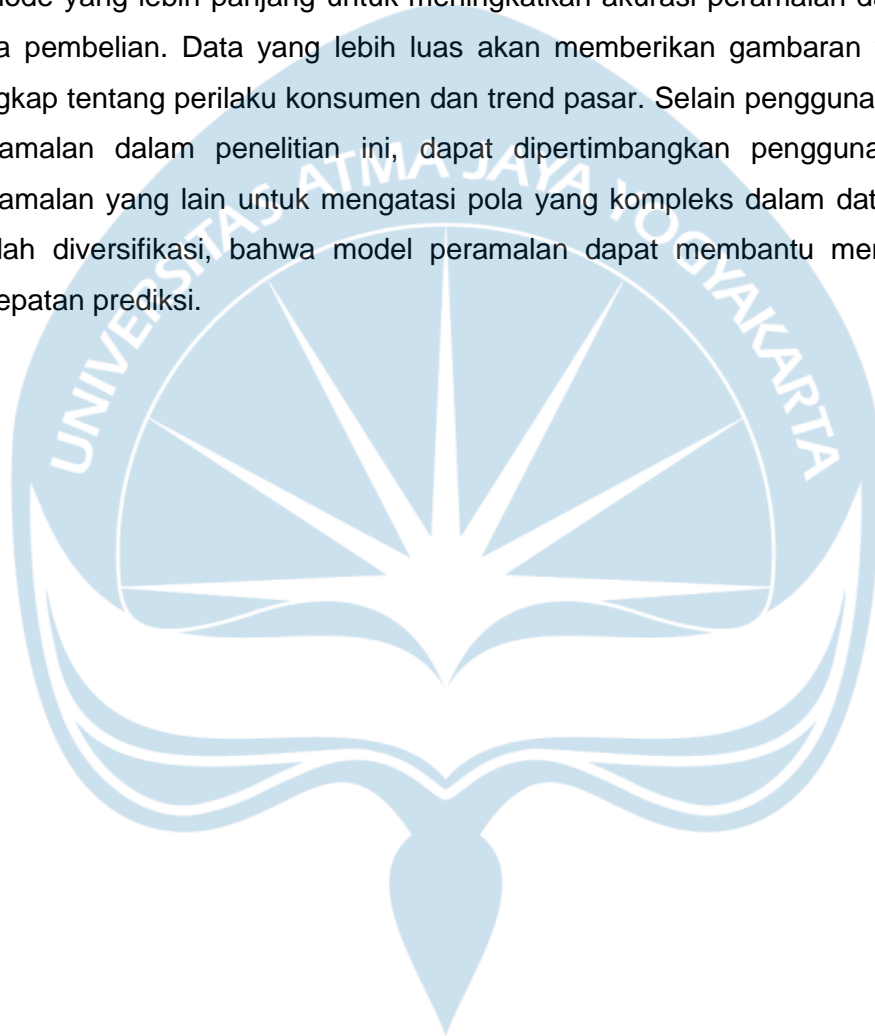
Framework ini juga merekomendasikan strategi pemasaran yang efektif, seperti bundling, cross-selling, dan penjualan independen, berdasarkan analisis pola pembelian konsumen. Strategi-strategi ini dapat membantu perusahaan meningkatkan penjualan dan efisiensi operasional. Penggunaan dashboard dalam framework ini memungkinkan perusahaan untuk memonitor dan mengevaluasi kinerja produk, pola pembelian konsumen, dan rekomendasi strategi pemasaran secara real-time. Dashboard ini memberikan pandangan holistik kepada perusahaan dan memberikan wawasan berharga untuk pengambilan keputusan yang lebih baik.

Berdasarkan hasil uji coba framework, terbukti bahwa framework ini dapat diaplikasikan tidak hanya pada studi kasus yang dianalisis tetapi juga pada berbagai jenis perusahaan lain yang ingin menentukan strategi pemasaran

berdasarkan pola perilaku konsumen. Framework ini fleksibel, efisien, dan dapat disesuaikan dengan kebutuhan perusahaan, sehingga mampu meningkatkan daya saing dan profitabilitas secara signifikan.

5.2. Saran

Disarankan untuk mengumpulkan lebih banyak data transaksi penjualan dari periode yang lebih panjang untuk meningkatkan akurasi peramalan dan analisis pola pembelian. Data yang lebih luas akan memberikan gambaran yang lebih lengkap tentang perilaku konsumen dan trend pasar. Selain penggunaan metode peramalan dalam penelitian ini, dapat dipertimbangkan penggunaan model peramalan yang lain untuk mengatasi pola yang kompleks dalam data. Dimana sudah diversifikasi, bahwa model peramalan dapat membantu meningkatkan ketepatan prediksi.



DAFTAR PUSTAKA

- Ahakhathreh, L. M., & Al-Hawary, S. I. S. (2022). Impact of Business Intelligence Capabilities on the Competitive Performance of Islamic Banks in Jordan. *Journal of Hunan University Natural Sciences*, 49(10), 204–217. <https://doi.org/10.55463/issn.1674-2974.49.10.22>
- Alghanam, O. A., Al-Khatib, S. N., & Hiari, M. O. (2022). Data Mining Model for Predicting Customer Purchase Behavior in e-Commerce Context. *International Journal of Advanced Computer Science and Applications*, 13(2), 421–428. <https://doi.org/10.14569/IJACSA.2022.0130249>
- Alnoukari, M., & Hanano, A. (2017). *Integration of business intelligence with corporate strategic management*. <https://ojs.hh.se/>
- Alwidian, J., Hammo, B. H., & Obeid, N. (2018). WCBA: Weighted classification based on association rules algorithm for breast cancer disease. *Applied Soft Computing Journal*, 62, 536–549. <https://doi.org/10.1016/j.asoc.2017.11.013>
- Arivukarasi, M., & Antonidoss, A. (2019). A cognitive support for identifying phishing websites using bi-ilstm and rnn. *International Journal of Recent Technology and Engineering*, 8(2), 3097–3102. <https://doi.org/10.35940/ijrte.B2646.078219>
- Atsani, M. R., Tyas Anjari, G., & Mega Saraswati, N. (2019). Pengembangan Business Intelligence Di Rumah Sakit (Studi Kasus: RSUD Prof. Dr. Margono Soekarjo Purwokerto). *Telematika*, 12(2), 124–138. <https://doi.org/10.35671/telematika.v12i2.839>
- B. Demisse, G., Tadesse, T., & Bayissa, Y. (2017). Data Mining Attribute Selection Approach for Drought Modelling : A Case Study for Greater Horn of Africa. *International Journal of Data Mining & Knowledge Management Process*, 7(4), 01–16. <https://doi.org/10.5121/ijdkp.2017.7401>
- Bach, M. P., Zoroja, J., & Čeljo, A. (2017). An extension of the technology acceptance model for business intelligence systems: Project management maturity perspective. *International Journal of Information Systems and Project Management*, 5(2), 5–21. <https://doi.org/10.12821/ijispm050201>
- Balachandran, B. M., & Prasad, S. (2017). Challenges and Benefits of Deploying Big Data Analytics in the Cloud for Business Intelligence. *Procedia Computer Science*, 112, 1112–1122. <https://doi.org/10.1016/j.procs.2017.08.138>

- Bany Mohammad, A., Al-Okaily, M., Al-Majali, M., & Masa'deh, R. (2022). Business Intelligence and Analytics (BIA) Usage in the Banking Industry Sector: An Application of the TOE Framework. *Journal of Open Innovation: Technology, Market, and Complexity*, 8(4). <https://doi.org/10.3390/joitmc8040189>
- Bousqaoui, H., Slimani, I., & Achchab, S. (2021). Comparative analysis of short-term demand predicting models using ARIMA and deep learning. *International Journal of Electrical and Computer Engineering*, 11(4), 3319–3328. <https://doi.org/10.11591/ijece.v11i4.pp3319-3328>
- Combata Niño, H. A., Cómbita Niño, J. P., & Morales Ortega, R. (2020). Business intelligence governance framework in a university: Universidad de la costa case study. *International Journal of Information Management*, 50, 405–412. <https://doi.org/10.1016/j.ijinfomgt.2018.11.012>
- Dahooei, J. H., Zavadskas, E. K., Vanaki, A. S., Firoozfar, H. R., & Keshavarz-Ghorabae, M. (2018). An evaluation model of business intelligence for enterprise systems with new extension of CODAS (CODAS-IVIF). *E a M: Ekonomie a Management*, 21(3), 171–187. <https://doi.org/10.15240/tul/001/2018-3-011>
- Dhariwal, A., Chong, J., Habib, S., King, I. L., Agellon, L. B., & Xia, J. (2017). MicrobiomeAnalyst: A web-based tool for comprehensive statistical, visual and meta-analysis of microbiome data. *Nucleic Acids Research*, 45(W1), W180–W188. <https://doi.org/10.1093/nar/gkx295>
- Dhyani*, B., Kumar, M., Verma, P., & Jain, A. (2020). Stock Market Forecasting Technique using Arima Model. *International Journal of Recent Technology and Engineering (IJRTE)*, 8(6), 2694–2697. <https://doi.org/10.35940/ijrte.F8405.038620>
- Ehie, I., & Ferreira, L. M. D. F. (2019). Conceptual development of supply chain digitalization framework. *IFAC-PapersOnLine*, 52(13), 2338–2342. <https://doi.org/10.1016/j.ifacol.2019.11.555>
- Fernandez, N. F., Gundersen, G. W., Rahman, A., Grimes, M. L., Rikova, K., Hornbeck, P., & Maayan, A. (2017). Clustergrammer, a web-based heatmap visualization and analysis tool for high-dimensional biological data. *Scientific Data*, 4. <https://doi.org/10.1038/sdata.2017.151>
- Fitriana, R., Saragih, J., & Luthfiana, N. (2017). Model business intelligence system design of quality products by using data mining in R Bakery Company. *IOP*

- Conference Series: Materials Science and Engineering*, 277(1).
<https://doi.org/10.1088/1757-899X/277/1/012005>
- Fitriah, D., & Zain, S. Y. (2021). *Analysis of Consumer Purchase Patterns on Handphone Accessories Sales Using FP-Growth Algorithm*.
<https://doi.org/10.2991/assehr.k.210421.022>
- Fu, Y., Yang, M., & Han, D. (2021). Interactive Marketing E-Commerce Recommendation System Driven by Big Data Technology. *Scientific Programming*, 2021. <https://doi.org/10.1155/2021/3873059>
- Ghosh Partha, Som Subhranil, & Soumsya Sen. (2018). *Business Intelligence Development by Analysing Customer Sentiment*.
<https://doi.org/10.1109/ICRITO.2018.8748517>
- Ghosh, S. (2021). *Forecasting of demand using ARIMA model*.
<https://ajamc.smartsociety.org/>
- H Rao, Z Zeng, & A Liu. (2018). *Research on Personalized Referral Service and Big Data Mining for E-commerce with Machine Learning*. 2018 4th International Conference on Computer and Technology Applications (ICCTA).
<https://doi.org/10.1109/CATA.2018.8398652>
- I Ernawati, & N Matondang. (2021). Product Bundling Application to Support Implementation of Association Rule Mining Using FP-Growth. *Jurnal Teknologi Informasi Dan Pendidikan*.
- Indah Prahartiwi, L. (2017). Pencarian Frequent Itemset pada Analisis Keranjang Belanja Menggunakan Algoritma FP-Growth. *INFORMATION SYSTEM FOR EDUCATORS AND PROFESSIONALS*, 2(1), 1–10. <http://ejournal-binainsani.ac.id/index.php/ISBI/article/view/584>
- Islamiyah, Dengen, N., Ginting, L. P., & Taruk, M. (2019). *Comparison of Priori and FP-Growth Algorithms in Determining Association Rules*. IEEE.
- Lee, I., & Mangalaraj, G. (2022). Big Data Analytics in Supply Chain Management: A Systematic Literature Review and Research Directions. In *Big Data and Cognitive Computing* (Vol. 6, Issue 1). MDPI.
<https://doi.org/10.3390/bdcc6010017>
- Li Yafang, & Li Yisong. (2018). *E-commerce Order Batching Algorithm based on Association Rule Mining in the Era of Big Data*.
<https://doi.org/10.1109/CCDC.2018.8407443>
- Lourenco, J., & Varde, A. S. (2020). Item-Based Collaborative Filtering and Association Rules for a Baseline Recommender in E-Commerce.

- Proceedings - 2020 IEEE International Conference on Big Data, Big Data 2020*, 4636–4645. <https://doi.org/10.1109/BigData50022.2020.9377807>
- Mardi, Y. (2017). Data Mining : Klasifikasi Menggunakan Algoritma C4.5. *Jurnal Edik Informatika Penelitian Bidang Komputer Sains Dan Pendidikan Informatika*.
- Massaro, A., Vitti, V., Galiano, A., & Morelli, A. (2019). Business Intelligence Improved by Data Mining Algorithms and Big Data Systems: An Overview of Different Tools Applied in Industrial Research. *Computer Science and Information Technology*, 7(1), 1–21.
<https://doi.org/10.13189/csit.2019.070101>
- Mikhnenko, P. A. (2022). Data-Mining as Tool of Multimodal Business-Analysis: Lexical Transformation in Annual Reports of Rostech Corporation. *Vestnik of the Plekhanov Russian University of Economics*, 6, 126–136.
<https://doi.org/10.21686/2413-2829-2022-6-126-136>
- Naeini, A. B., Abaee, A., & Zamani, M. (2019). Designing a business intelligence conceptual model of supply chain management in sales-based SMEs Designing a business intelligence conceptual model 155. In *Int. J. Logistics Systems and Management* (Vol. 34, Issue 2).
<https://doi.org/https://doi.org/10.1504/IJLSM.2019.102213>
- Nasir, I. S., Mousa, A. H., & Hussein Alsammak, I. L. (2021). SMUPI-BIS: A synthesis model for users' perceived impact of business intelligence systems. *Indonesian Journal of Electrical Engineering and Computer Science*, 21(3), 1856–1867. <https://doi.org/10.11591/ijeecs.v21.i3.pp1856-1867>
- Oladele, T. O., Ogundokun, R. O., Adegun, A. A., Adeniyi, E. A., & Ajanaku, A. T. (2021). Development of an inventory management system using association rule. *Indonesian Journal of Electrical Engineering and Computer Science*, 21(3), 1868–1876. <https://doi.org/10.11591/ijeecs.v21.i3.pp1868-1876>
- Ozturk, S., & Ozturk, F. (2018). Forecasting Energy Consumption of Turkey by Arima Model. *Journal of Asian Scientific Research*, 8(2), 52–60.
<https://doi.org/10.18488/journal.2.2018.82.52.60>
- Parikh, V. U., Shah, P., & Parikh, V. (2015). *E-commerce Recommendation System using Association Rule Mining and Clustering*.
<https://www.researchgate.net/publication/278968646>
- Ramos, C. M. Q., Martins, D. J., Serra, F., Lam, R., Cardoso, P. J. S., Correia, M. B., & Rodrigues, J. M. F. (2017). Framework for a hospitality big data

- warehouse: The implementation of an efficient hospitality business intelligence system. *International Journal of Information Systems in the Service Sector*, 9(2), 27–45. <https://doi.org/10.4018/IJISSS.2017040102>
- Rezaie, S., Mirabedini, J., & Abtahi, A. (2017). *Identifying key effective factors on the implementation process of business intelligence in the banking industry of Iran*. <https://ojs.hh.se/>
- Riyadi, N., Mulki, M. F., & Susanto, R. (2019). Analysis of Customers Purchase Patterns of E-Commerce Transactions Using Apriori Algorithm and Sales Forecasting Analysis With Weighted Moving Average (WMA) Methods. *Scientific Research Journal*, VII(VII). <https://doi.org/10.31364/scirj/v7.i7.2019.p0719670>
- Robu, V., Duarte, V., & Santos, D. (2019). Mining Frequent Patterns in Data Using Apriori and Eclat: A Comparison of the Algorithm Performance and Association Rule Generation. In *2019 6th International Conference on Systems and Informatics (ICSAI)*.
- Sahai, A. K., Rath, N., Sood, V., & Singh, M. P. (2020). ARIMA modelling & forecasting of COVID-19 in top five affected countries. *Diabetes and Metabolic Syndrome: Clinical Research and Reviews*, 14(5), 1419–1427. <https://doi.org/10.1016/j.dsx.2020.07.042>
- Saksena, A. K., & Agarwal, R. (2021, January 27). Methods for Classification of Items for Inventory Management. *2021 International Conference on Computer Communication and Informatics, ICCCI 2021*. <https://doi.org/10.1109/ICCCI50826.2021.9402588>
- Sharma, A., & Ganpati, A. (2021). ASSOCIATION RULE MINING ALGORITHMS: A COMPARATIVE REVIEW. *International Research Journal of Engineering and Technology*. www.irjet.net
- Silvana, M., & Akbar, R. (2017). Pengembangan Model Business Intelligence Manajemen Rumah Sakit untuk Peningkatan Mutu Pelayanan (Studi Kasus : Semen Padang Hospital). *Jurnal Edukasi Dan Penelitian Informatika (JEPIN)*, 3(2). <https://doi.org/http://dx.doi.org/10.26418/jp.v3i2.22833>
- Son, L. H., Chiclana, F., Kumar, R., Mittal, M., Khari, M., Chatterjee, J. M., & Baik, S. W. (2018). ARM–AMO: An efficient association rule mining algorithm based on animal migration optimization. *Knowledge-Based Systems*, 154, 68–80. <https://doi.org/10.1016/j.knosys.2018.04.038>

- Souibgui, M., Atigui, F., Zammali, S., Cherfi, S., & Yahia, S. Ben. (2019). Data quality in ETL process: A preliminary study. *Procedia Computer Science*, 159, 676–687. <https://doi.org/10.1016/j.procs.2019.09.223>
- Srinadh, V. (2022). Evaluation of Apriori, FP growth and Eclat association rule mining algorithms. *International Journal of Health Sciences*, 7475–7485. <https://doi.org/10.53730/ijhs.v6ns2.6729>
- Stehel, V., Horak, J., & Krulicky, T. (2021). Business performance assessment of small and medium-sized enterprises: Evidence from the Czech Republic. *Problems and Perspectives in Management*, 19(3), 430–439. [https://doi.org/10.21511/ppm.19\(3\).2021.35](https://doi.org/10.21511/ppm.19(3).2021.35)
- Täuscher, K., & Laudien, S. M. (2018). Understanding platform business models: A mixed methods study of marketplaces. *European Management Journal*, 36(3), 319–329. <https://doi.org/10.1016/j.emj.2017.06.005>
- Wang, F., Li, K., Duić, N., Mi, Z., Hodge, B. M., Shafie-khah, M., & Catalão, J. P. S. (2018). Association rule mining based quantitative analysis approach of household characteristics impacts on residential electricity consumption patterns. *Energy Conversion and Management*, 171, 839–854. <https://doi.org/10.1016/j.enconman.2018.06.017>
- Widjaja, S., & Mauritsius, T. (2019). The Development of Performance Dashboard Visualization with Power BI as Platform. *International Journal of Mechanical Engineering and Technology (IJMET)*, 10(5), 235–249.
- Zhang, J., Brintrup, A., Calinescu, A., Kosasih, E., & Sharma, A. (2021). *Supply Chain Digital Twin Framework Design: An Approach of Supply Chain Operations Reference Model and System of Systems*. <https://doi.org/https://doi.org/10.48550/arXiv.2107.09485>
- Zhou, G., Ewald, J., & Xia, J. (2021). OmicsAnalyst: A comprehensive web-based platform for visual analytics of multi-omics data. *Nucleic Acids Research*, 49(W1), W476–W482. <https://doi.org/10.1093/nar/gkab394>

LAMPIRAN

Lampiran 1. Kode R

```
# calling the library
install.packages("arules")
library(arules)
library(arulesViz)
transaksi <- read.csv("D:/data transaksi batu.csv")
View(transaksi)
tranksaksi <- read.transactions("D:/data transaksi batu.csv",sep=",")
class(transaksi)
inspect(transaksi[1:5])
summary(tranksaksi)
# displaying the ten most common items in the dataset, as well as the items
with a relative significance of at least 10%
par(mfrow = c(1, 2))
# plot the frequency of items
itemFrequencyPlot(tranksaksi, topN = 10, col="blue")
itemFrequencyPlot(tranksaksi, support = 0.1, col="darkred")
# building a model with rules of association using 0.6 for confidence and
0.001 for minimum support
#Application Algorithms Apriori
rules <- apriori (tranksaksi, parameter = list(supp = 0.1, conf = 0.2))
summary(rules)
inspect(rules[1:14])
# ordering the rules by a criteria
rules<-sort(rules, by="confidence", decreasing=TRUE)
inspect(rules[1:14])

rules<-sort(rules, by="support", decreasing=TRUE)
inspect(rules[1:14])
rules<-sort(rules, by="lift", decreasing=TRUE)
```

```

inspect(rules[1:7])
#Application Algorithms Eclat
eclats <- eclat(transaksi, parameter = list(supp = 0.1 , minlen= 2))
inspect(eclats)
rules <- sort(eclats, by="support", decreasing=TRUE)
inspect(rules[1:10])

```

Lampiran 2. Tabel Peramalan Item Sebelum menggunakan Association Rule

Tabel 1. Peramalan Item Sukabumi Green

Date	Sukabumi Green	Forecast	ABSOLUTE ERROR	MAPE
01 January 2021	5800	6983	1183	0,203966
01 February 2021	6800	6983	183	0,026912
01 March 2021	7200	6983	217	0,030139
01 April 2021	10000	6983	3017	0,3017
01 May 2021	6000	6983	983	0,163833
01 June 2021	7000	6983	17	0,002429
01 July 2021	10600	6983	3617	0,341226
01 August 2021	5000	6983	1983	0,3966
01 September 2021	5600	6983	1383	0,246964
01 October 2021	4000	6983	2983	0,74575
01 November 2021	3600	6983	3383	0,939722
01 December 2021	12200	6983	5217	0,427623
Nilai Total	83800	83796	Nilai Rata-rata	0,318905

Tabel 2. Peramalan Item Palimanan Yellow

Date	Palimanan Yellow	FORCAST	ABSOLUTE ERROR	MAPE
01 January 2021	600	1050	450	0,75
01 February 2021	1000	1050	50	0,05
01 March 2021	1600	1050	550	0,34375
01 April 2021	0	1050	1050	0
01 May 2021	800	1050	250	0,3125
01 June 2021	1000	1050	50	0,05
01 July 2021	1000	1050	50	0,05
01 August 2021	1200	1050	150	0,125
01 September 2021	1200	1050	150	0,125
01 October 2021	1400	1050	350	0,25
01 November 2021	800	1050	250	0,3125
01 December 2021	2000	1050	950	0,475
Nilai Total	12600	12600	Nilai Rata-rata	0,236979167

Tabel 3. Peramalan Item Classic White

Date	Classic White	FORCAST	ABSOLUTE ERROR	MAPE
01 January 2021	1000	1716,666667	716,6666667	0,716666667
01 February 2021	1600	1716,666667	116,6666667	0,072916667
01 March 2021	1700	1716,666667	16,66666667	0,009803922
01 April 2021	200	1716,666667	1516,666667	7,583333333
01 May 2021	1900	1716,666667	183,3333333	0,096491228
01 June 2021	2500	1716,666667	783,3333333	0,313333333
01 July 2021	700	1716,666667	1016,666667	1,452380952
01 August 2021	2800	1716,666667	1083,333333	0,386904762
01 September 2021	1300	1716,666667	416,6666667	0,320512821
01 October 2021	3100	1716,666667	1383,333333	0,446236559
01 November 2021	1100	1716,666667	616,6666667	0,560606061
01 December 2021	2700	1716,666667	983,3333333	0,364197531
Nilai Total	20600	20600	Nilai Rata-rata	1,026948653

Tabel 4. Peramalan Item Black Lava

Date	Black Lava	FORCAST	ABSOLUTE ERROR	MAPE
01 January 2021	700	666,6666667	33,33333333	0,047619048
01 February 2021	500	666,6666667	166,6666667	0,333333333
01 March 2021	100	666,6666667	566,6666667	5,666666667
01 April 2021	3000	666,6666667	2333,333333	0,777777778
01 May 2021	100	666,6666667	566,6666667	5,666666667
01 June 2021	500	666,6666667	166,6666667	0,333333333
01 July 2021	800	666,6666667	133,3333333	0,166666667
01 August 2021	200	666,6666667	466,6666667	2,333333333
01 September 2021	300	666,6666667	366,6666667	1,222222222
01 October 2021	200	666,6666667	466,6666667	2,333333333
01 November 2021	700	666,6666667	33,33333333	0,047619048
01 December 2021	900	666,6666667	233,3333333	0,259259259
Nilai Total	8000	8000	Nilai Rata-rata	1,598985891

Tabel 5. Peramalan Item Black Andesite

Date	Black Andesite	FORCAST	ABSOLUTE ERROR	MAPE
01 January 2021	300	-60,28361927	360,2836193	1,200945398
01 February 2021	100	392,4773843	292,4773843	2,924773843
01 March 2021	600	392,4773843	207,5226157	0,345871026
01 April 2021	0	392,4773843	392,4773843	0
01 May 2021	300	392,4773843	92,47738432	0,308257948
01 June 2021	1000	392,4773843	607,5226157	0,607522616
01 July 2021	200	392,4773843	192,4773843	0,962386922
01 August 2021	400	392,4773843	7,522615684	0,018806539
01 September 2021	300	392,4773843	92,47738432	0,308257948
01 October 2021	400	392,4773843	7,522615684	0,018806539
01 November 2021	200	392,4773843	192,4773843	0,962386922
01 December 2021	1100	392,4773843	707,5226157	0,643202378
Nilai Total	4900	4256,967608	Nilai Rata-rata	0,691768173

Tabel 6. Peramalan Item Slate

Date	Slate	FORCAST	ABSOLUTE ERROR	MAPE
01 January 2021	400	933,3333333	533,3333333	1,333333333
01 February 2021	400	933,3333333	533,3333333	1,333333333
01 March 2021	400	933,3333333	533,3333333	1,333333333
01 April 2021	0	933,3333333	933,3333333	0
01 May 2021	400	933,3333333	533,3333333	1,333333333
01 June 2021	2000	933,3333333	1066,666667	0,533333333
01 July 2021	0	933,3333333	933,3333333	0
01 August 2021	800	933,3333333	133,3333333	0,166666667
01 September 2021	1200	933,3333333	266,6666667	0,222222222
01 October 2021	800	933,3333333	133,3333333	0,166666667
01 November 2021	2800	933,3333333	1866,666667	0,666666667
01 December 2021	2000	933,3333333	1066,666667	0,533333333
Nilai Total			Nilai Rata-rata	0,635185185

Tabel 7. Peramalan Item Ocean Wave

Date	Ocean Wave	FORCAST	ABSOLUTE ERROR	MAPE
01 January 2021	200	250	50	0,25
01 February 2021	800	250	550	0,6875
01 March 2021	0	250	250	0
01 April 2021	0	250	250	0
01 May 2021	0	250	250	0
01 June 2021	0	250	250	0
01 July 2021	1400	250	1150	0,821428571
01 August 2021	200	250	50	0,25
01 September 2021	200	250	50	0,25
01 October 2021	0	250	250	0
01 November 2021	0	250	250	0
01 December 2021	200	250	50	0,25
Nilai Total	3000	3000	Nilai Rata-rata	0,209077381

Lampiran 3. Peramalan Item Setelah menggunakan Association Rule

Tabel 8. Peramalan Item Sukabumi Green dan Item Berpasangannya

Date	Sukabumi Green	Sukabumi Green & Black Andesite	Sukabumi Green & Palimanan Yellow	Total Jumlah	AE	MAPE
01 January 2021	3566,666667	-632,4297997	1666,666667	4600,9035	1199,096466	0,20674077
01 February 2021	3566,666667	1678,832595	1666,666667	6912,1659	112,165928	0,016494989
01 March 2021	3566,666667	1678,832595	1666,666667	6912,1659	287,834072	0,039976954
01 April 2021	3566,666667	1678,832595	1666,666667	6912,1659	3087,834072	0,308783407
01 May 2021	3566,666667	1678,832595	1666,666667	6912,1659	912,165928	0,152027655
01 June 2021	3566,666667	1678,832595	1666,666667	6912,1659	87,83407199	0,012547725
01 July 2021	3566,666667	1678,832595	1666,666667	6912,1659	3687,834072	0,347908875
01 August 2021	3566,666667	1678,832595	1666,666667	6912,1659	1912,165928	0,382433186
01 September 2021	3566,666667	1678,832595	1666,666667	6912,1659	1312,165928	0,234315344
01 October 2021	3566,666667	1678,832595	1666,666667	6912,1659	2912,165928	0,728041482
01 November 2021	3566,666667	1678,832595	1666,666667	6912,1659	3312,165928	0,920046091
01 December 2021	3566,666667	1678,832595	1666,666667	6912,1659	5287,834072	0,433429022
Total Jumlah	42800	17834,72874	20000	80634,729	Nilai Rata-rata	0,315228792

Tabel 9. Peramalan Item Palimanan Yellow dan Item Berpasangannya

Date	Palimanan Yellow	Palimanan Yellow & Classic White	Palimanan Yellow & Sukabumi Green	Total Jumlah	AE	MAPE
01 January 2021	257,638499	400	416,6666667	1074,305166	474,3051657	0,790508609
01 February 2021	225,8177348	400	416,6666667	1042,484402	42,4844015	0,042484402
01 March 2021	225,8177348	400	416,6666667	1042,484402	557,5155985	0,348447249
01 April 2021	225,8177348	400	416,6666667	1042,484402	1042,484402	0
01 May 2021	225,8177348	400	416,6666667	1042,484402	242,4844015	0,303105502
01 June 2021	225,8177348	400	416,6666667	1042,484402	42,4844015	0,042484402
01 July 2021	225,8177348	400	416,6666667	1042,484402	42,4844015	0,042484402
01 August 2021	225,8177348	400	416,6666667	1042,484402	157,5155985	0,131262999
01 September 2021	225,8177348	400	416,6666667	1042,484402	157,5155985	0,131262999
01 October 2021	225,8177348	400	416,6666667	1042,484402	357,5155985	0,255368285
01 November 2021	225,8177348	400	416,6666667	1042,484402	242,4844015	0,303105502
01 December 2021	225,8177348	400	416,6666667	1042,484402	957,5155985	0,478757799
Total Jumlah	2741,633582	4800	5000	12541,63358	Nilai Rata-rata	0,239106012

Tabel 10. Peramalan Item Classic White dan Item Berpasangannya

Date	Classic White	Classic White & Palimanan Yellow	Total Jumlah	AE	MAPE
01 January 2021	1116,666667	600	1716,666667	716,666667	0,716666667
01 February 2021	1116,666667	600	1716,666667	116,666667	0,072916667
01 March 2021	1116,666667	600	1716,666667	16,6666667	0,009803922
01 April 2021	1116,666667	600	1716,666667	1516,666667	7,583333333
01 May 2021	1116,666667	600	1716,666667	183,3333333	0,096491228
01 June 2021	1116,666667	600	1716,666667	783,3333333	0,313333333
01 July 2021	1116,666667	600	1716,666667	1016,666667	1,452380952
01 August 2021	1116,666667	600	1716,666667	1083,333333	0,386904762
01 September 2021	1116,666667	600	1716,666667	416,6666667	0,320512821
01 October 2021	1116,666667	600	1716,666667	1383,333333	0,446236559
01 November 2021	1116,666667	600	1716,666667	616,6666667	0,560606061
01 December 2021	1116,666667	600	1716,666667	983,3333333	0,364197531
Total Jumlah	13400	7200	20600	Nilai Rata-rata	1,026948653

Tabel 11. Peramalan Item Black Lava dan Item Berpasangannya

Date	Black Lava	Black Lava & Slate	Total Jumlah	AE	MAPE
01 January 2021	433,3333333	233,3333333	666,6666667	33,33333333	0,047619048
01 February 2021	433,3333333	233,3333333	666,6666667	166,6666667	0,333333333
01 March 2021	433,3333333	233,3333333	666,6666667	566,6666667	5,666666667
01 April 2021	433,3333333	233,3333333	666,6666667	233,3333333	0,777777778
01 May 2021	433,3333333	233,3333333	666,6666667	566,6666667	5,666666667
01 June 2021	433,3333333	233,3333333	666,6666667	166,6666667	0,333333333
01 July 2021	433,3333333	233,3333333	666,6666667	133,3333333	0,166666667
01 August 2021	433,3333333	233,3333333	666,6666667	466,6666667	2,333333333
01 September 2021	433,3333333	233,3333333	666,6666667	366,6666667	1,222222222
01 October 2021	433,3333333	233,3333333	666,6666667	466,6666667	2,333333333
01 November 2021	433,3333333	233,3333333	666,6666667	33,33333333	0,047619048
01 December 2021	433,3333333	233,3333333	666,6666667	233,3333333	0,259259259
Total Jumlah	5200	2800	8000	Nilai Rata-rata	1,598985891

Tabel 12. Peramalan Item Black Andesite dan Item Berpasangannya

Date	Black Andesite	Black Lava & Sukabumi Green	Total Jumlah	AE	MAPE
01 January 2021	64,40962475	-126,4859599	-62,0763352	362,0763352	1,206921117
01 February 2021	56,45443371	335,7665189	392,2209526	292,2209526	2,922209526
01 March 2021	56,45443371	335,7665189	392,2209526	207,7790474	0,346298412
01 April 2021	56,45443371	335,7665189	392,2209526	392,2209526	0
01 May 2021	56,45443371	335,7665189	392,2209526	92,22095264	0,307403175
01 June 2021	56,45443371	335,7665189	392,2209526	607,7790474	0,607779047
01 July 2021	56,45443371	335,7665189	392,2209526	192,2209526	0,961104763
01 August 2021	56,45443371	335,7665189	392,2209526	7,779047356	0,019447618
01 September 2021	56,45443371	335,7665189	392,2209526	92,22095264	0,307403175
01 October 2021	56,45443371	335,7665189	392,2209526	7,779047356	0,019447618
01 November 2021	56,45443371	335,7665189	392,2209526	192,2209526	0,961104763
01 December 2021	56,45443371	335,7665189	392,2209526	707,7790474	0,643435498
Total Jumlah	685,4083955	3566,945748	4252,354144	Nilai Rata-rata	0,69187956