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Feasibility Analysis of ERP Implementation and Demand Forecasting at RM Pondok Ciung Tanjungpinang

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Abstract

This study aims to analyze the feasibility of implementing ERP in Supply Chain Management with a qualitative approach and measuring demand forecasting quantitatively in UMKM RM Pondok Ciung Tanjungpinang. Data was obtained by the author through direct interviews. Data is managed using the Weighted Moving Average and Exponential Smoothing formulas which will then be tested for error rates. The findings of this study are that RM Pondok Ciung uses Majoo as a Point of Sales (POS) system and the method that is suitable for demand forecasting is the exponential smoothing method which is tested with Mean Square Error (MSE) and Mean Absolute Error (MSE).

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1. Introduction

ERP implementation is needed to face challenges that may arise in company operations (Andulkar et al., 2018) with existing developments companies are required to utilize technology in operations (Jayender & Goutam Kumar Kundu, 2021). According to (Charamis, 2018) and (Febrianto & Soediantono, 2022) the implementation of an ERP system provides precise, accurate and comprehensive information to realize company standardization and can increase company efficiency by being integrated into e-business and the company's supply chain system.

Integration between Enterprise Resource Planning (ERP) and the supply chain can help companies in production to meet consumer needs (Calystania et al., 2022). Forecasting demand for future needs is needed to meet demand for goods and services and avoid errors in decision-making (Tabroni, 2022) and production capabilities regarding estimates of future demand (Setyowati, 2017). The ability to accurately predict demand can be one of the success factors for a restaurant (Posch et al., 2021). Therefore, demand forecasting is a crucial factor in business success.

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The research was conducted referring to previous research by (Nurdina et al., 2022) using a weighted moving average to forecast demand for golang-galing. Based on this research, the author will carry out forecasting by comparing this method with exponential smoothing. References by (Sahli & Susanti, 2013) (Asynari et al., 2020) and (Rachman, 2018) are used as support in this research.

The object that will be carried out for MSMEs in the culinary sector is RM Pondok Ciung which is located in Kijang City, Riau Islands Province. Initially, RM Pondok Ciung was a family business started by Agustardi in 1999. This restaurant served grilled fish and chicken as the main menu with concoctions of spices that produced an authentic taste. The development of RM Pondok Ciung's business can be seen from the number of human resources, who were initially family members and recruited employees.

This research aims to analyze the application of Enterprise Resource Planning (ERP) and carry out demand forecasting. The accuracy of selecting an Enterprise Resource Planning (ERP) system according to the needs of MSMEs is the focus of research. The author certainly hopes that this research can provide benefits for MSMEs, namely being able to meet consumer needs using demand forecasting methods.

2. Research Method

This research aims to examine the implementation of ERP with a qualitative approach and carry out demand forecasting with a quantitative approach at RM Pondok Ciung Tanjungpinang. Data collection was carried out through direct interviews with management. This data will be further managed to produce suggestions and recommendations for MSMEs.

The demand data used is chicken and bruised fish, which are the two mainstay products of MSMEs in the period March 2022 to February 2023. The first data management will be calculated using the weighted moving average and exponential smoothing formulas. This research uses Microsoft Excel software to carry out calculations using predetermined formulas. Error level testing will be carried out to obtain the best demand forecasting method.

Weighted Moving Average

Weighted Moving Average menggunakan nilai terbaru yang lebih besar pada data terakhir, dibandingkan dengan data sebelumnya (Silvya et al., 2020)

Dt = Actual data for the period t

Bobot = The weight given to each month

Exponential Smoothing

Exponential Smoothing melakukan perhitungan secara terus menerus dengan bobot yang biasanya disimbolkan dengan alpha (Maricar, 2019).

Ft = forecast value period
Ft-1 = previous period forecasting data
A = constant with value $0 < \alpha < 1$
At -1 = actual data for the previous period

Mean Square Error

The Mean Absolute Error (MSE) test is a squared average value that describes the level of error that occurs between the actual value and the forecast value (Rachman, 2018). MSE can produce a small average error value which is better than a large average value.

Y' = forecast value period
Y = forecasting data for the previous period
n = constant with values $0 < \alpha < 1$

Mean Absolute Error

Mean Absolute Error measures the level of accuracy of a forecast by calculating the magnitude of the error where the differences have the same value. The smaller the value obtained, the better the results (Afghani, 2019).

yt = predicted value of data
ft = actual data value
n = number of data

3. Results

Pondok Ciung Restaurant carries out business operations using manual and system records. Divisions that still use conventional systems are Human Resources (HR), purchasing, and warehouse. The owner carries out this process by carrying out manual recording using Excel and other supporting software. Findings from direct interviews found that an integrated ERP system had not been implemented but MSMEs used a Point of Sales (POS) system. The cashier system called Majoo is used to enable data presentation and access more easily than conventional methods.

The Majoo system used by RM Pondok Ciung requires a monthly subscription fee of 150,000 Rupiah. The costs incurred for subscribing to the Majoo Point of Sales (POS) system are in accordance with the business scale and needs of MSMEs. Culinary businesses will need ERP if they have many branches inside and outside the city. Thus, the urgency of using ERP will become crucial when the business grows.

4. Discussion

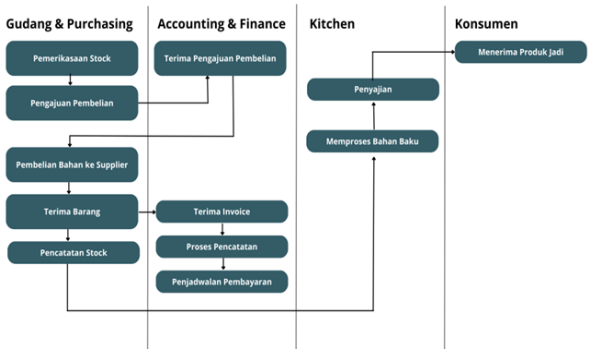

Figure 1. Raw Material Management Workflow

Management for raw material inventory can be illustrated with the picture presented above. There are three work divisions that will work together and coordinate with each other, namely the warehouse and purchasing, accounting and finance and kitchen sections. This series or work procedure was obtained based on interviews and direct observation during the work process.

The process starts from checking stock and continues with the application for purchasing goods that are out of stock for purchase. Submissions will be made first and then checked and recorded by accounting and finance. Raw materials will be ordered from suppliers until the goods are received, checked and stored according to SOP. After that, the kitchen team will carry out the processing of raw materials into food before they reach consumers.

Comparison of Forecasting Error Rates

Forecasting demand cannot be separated from errors or mistakes that occur. Error testing is carried out to find the best method or has a lower error rate. Testing is carried out by calculating the Mean Square Error (MSE) and Mean Absolute Error (MAE). Test error rates of the two methods are shown in the following table

Table 1. Comparison of Forecasting Error Rates

Metode	Produk	MSE	MAE
Weighted Moving Average	Ayam	37.252,51	1,89
	Lebam	11.224,90	2,73
Exponential Smoothing	Ayam	832,32	15,76
	Lebam	1.514,00	7,23

The error rate that occurs according to the Mean Square Error (MSE) in chicken products is 832.32 with exponential smoothing which is lower than the weighted moving average method, namely 37,252.11. The exponential smoothing bruised fish forecasting data has an error rate of 1,514 which is lower than 11,224.90 with the weighted moving average method.

The Mean Absolute Error (MAE) test on exponential smoothing chicken demand data with a value of 15.76 is greater than the weighted moving average of 1.89. Forecasting bruised demand with a weighted moving average has a lower error rate than exponential smoothing, namely 2.73 versus 7.23.

Separately, Mean Square Error (MSE) produces a smaller error value using the exponential smoothing method. Meanwhile, testing the Mean Absolute Error (MAE) on this data produces a smaller error rate on the weighted moving average. Overall or accumulated testing produces a better exponential smoothing method with a lower error rate.

5. Conclusions and Suggestions

Conclusion

Research on the feasibility of Enterprise Resource Planning (ERP) in Supply Chain Management at RM Pondok Ciung Tanjungpinang resulted that the implementation of ERP is not yet recommended. The Point of Sales (POS) system with Majoo software implemented by MSMEs is the right step because of the suitability of the business scale and affordable costs. Implementing ERP can be considered if the business scale increases, for example adding branches or expanding the business outside the region. MSMEs can use open source ERP such as Odoo and ERPNext which are quite affordable and can be customized according to their needs.

Calculation of demand forecasting by comparing the two methods produces exponential smoothing with a lower test error value than the weighted moving average. Tests by smoothing demand data from March 2022 to February 2023 for bruised fish and chicken produced more accurate data.

Suggestion

However, with MSME products in the form of processed food, there are uncertainty factors that can occur, such as increases in food prices or shortages. The limitation of this research is the possibility of unexpected factors that could cause demand forecasting to be less accurate. Suggestions for further research are to determine the forecasting period needed and recommendations for using short-term data such as 3 or 6 months to minimize the possibility of uncertainty factors in forecasting.

6. References

Afghani, M. A. (2019). Seasonal Autoregressive Integrated Moving Average dan Artificial Neural Network Untuk Memprediksi Data Seasonal. E-Proceeding of Engineering, 6(2), 9986–9996.

Andulkar, M., Le, D. T., & Belger, U. (2018). A Multi-Case Study on Industry 4.0 for SME's in Brandenburg, Germany. Proceedings of the 51st Hawaii International Conference on System Sciences.

Asynari, E., Wahyudi, D., & Aeni, Q. (2020). Analisis Peramalan Permintaan Pada Geprek Bensu Menggunakan Metode Time Series. JURTEKSI (Jurnal Teknologi Dan Sistem Informasi), 6(2), 215–220. https://doi.org/https://doi.org/10.33330/jurteksi.v6i3.424

Calystania, V., Hasvia, T. G., Jones, J. H., Bhuan, S., & Valentino, J. (2022). Analisis Manfaat Penerapan manajemen Rantai Pasok dan ERP. JURNAL MANAJEMEN, 14(2), 479–486.

Charamis, D. (2018). Increasing Competitiveness in the Textile Industry: A Focus on the Accounting Benefits of ERP Systems by Exploring Cases from the UK & Greece. Theoretical Economics Letters, 8(5), 1044–1057.

Febrianto, T., & Soediantono, D. (2022). Enterprise Resource Planning (ERP) and Implementation Suggestion to the Defense Industry: A Literature Review. Journal of Industrial Engineering & Management Research, 3(3), 1–16.

Jayender, P., & Goutam Kumar Kundu. (2021). Intelligent ERP for SCM Agility And Graph Theory Technique For Adaptation In Automotive Industry In India. Nternationa Journa of System Assurance Engineering and Management, 1–22. https://doi.org/https://doi.org/10.1007/s13198-021-01361-y

Maricar, M. A. (2019). Analisa Perbandingan Nilai Akurasi Moving Average dan Exponential Smoothinguntuk Sistem Peramalan Pendapatan pada Perusahaan XYZ. JURNAL SISTEM DAN INFORMATIKA, 13(2), 36–45.

Nurdina, A., Aryani, D., & Venita, E. (2022). Analisis Peramalan Permintaan Golang-Galing dalam Memaksimalkan Manajemen Rantai Pasok Menggunakan Metode Weighted Moving Average. JURIKOM (Jurnal Riset Komputer), 9(4), 1167–1173.

Posch, K., Truden, C., Hungerländer, P., & Pilz, J. (2021). A Bayesian Approach for Predicting Food and Beverage Sales in Staff Canteens and Restaurants. International Journal of Forecasting. https://doi.org/https://doi.org/10.1016/j.ijforecast.2021.06.001

Rachman, R. (2018). Penerapan Metode Moving Average dan Exponential Smoothing pada Peramalan Produksi Industri Garment. JURNAL INFORMATIKA, 5(3), 211–220.

Sahli, M., & Susanti, N. (2013). Penerapan Metode Exponential Smoothing Dalam Sistem Informasi Pengendalian Persediaan Bahan Baku (Studi Kasus Toko Tirta Harum). Jurnal SIMETRIS, 3(1).

Setyowati. (2017). Skripsi "Penerapan Metode Single Exponential Smoothing dan Double Exponential Smoothing pada Peramalan Penjualan Pakaian." simki.unpkediri.ac.id

Silvya, Z., Zakir, A., & Irwan, D. (2020). Penerapan Metode Weighted Moving Average untuk Peramalan Persediaan Produk Farmasi. Jurnal Ilmiah Teknologi Harapan, 8(2), 59–64.

Tabroni. (2022). Analisis Forecasting Demand Dengan Metode Deskriptif Dan Pendekatan Kualitatif Pada Penjualan Produk Baju Batik. Indonesian Journal of Economy, Business, Entrepreneuship and Finance, 2(3).