Analisis Efektivitas Persediaan Metode FIFO (*First In First Out*) terhadap Pengiriman Gandum ke Mill di PT Indofood Sukses Makmur Tbk, Div Bogasari Jakarta

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Abstract
This study aims to analyze the effect of FIFO inventory effectiveness on wheat delivery to the mill at PT Indofood Sukses Makmur Tbk, Bogasari Division. The analysis was conducted using simple linear regression. The results show that the R-value of 0.730 indicates a strong relationship between FIFO inventory effectiveness and wheat delivery. If the R value is 0.730, the relationship between the variables is considered strong. If the t-value (7.420) is greater than the t-table value (2.010), then FIFO inventory effectiveness significantly influences wheat delivery. Additionally, the coefficient of determination (R-squared) of 0.533 indicates that the FIFO method accounts for 53.3% of wheat delivery. The regression equation yields Y = 4.295 + 0.409X, indicating that a one-unit increase in FIFO inventory effectiveness increases wheat delivery by 0.409 units. These findings confirm that implementing the FIFO method in inventory management can enhance logistics efficiency and raw material distribution. Therefore, optimizing inventory management strategies using FIFO is highly recommended to support operational smoothness and improve logistics performance at PT Indofood Sukses Makmur Tbk, Bogasari Division.

Keywords: *FIFO inventory system; inventory control effectiveness; wheat delivery performance; logistics efficiency; simple linear regression analysis*.

Abstrak
Penelitian ini bertujuan untuk menganalisis pengaruh efektivitas persediaan FIFO terhadap pengiriman gandum ke pabrik penggilingan di PT Indofood Sukses Makmur Tbk, Divisi Bogasari. Analisis dilakukan menggunakan regresi linier sederhana. Hasil penelitian menunjukkan bahwa nilai R sebesar 0,730 mengindikasikan hubungan yang kuat antara efektivitas persediaan FIFO dan pengiriman gandum. Jika nilai R sebesar 0,730, hubungan antar variabel dianggap kuat. Jika nilai t (7,420) lebih besar dari nilai t tabel (2,010), maka efektivitas persediaan FIFO secara signifikan mempengaruhi pengiriman gandum. Selain itu, koefisien determinasi (R-kuadrat) sebesar 0,533 menunjukkan bahwa metode FIFO menyumbang 53,3% dari pengiriman gandum. Persamaan regresi menghasilkan Y = 4,295 + 0,409X, yang menunjukkan bahwa peningkatan satu unit efektivitas persediaan FIFO meningkatkan pengiriman gandum sebesar 0,409 unit. Temuan ini menegaskan bahwa penerapan metode FIFO dalam manajemen persediaan dapat meningkatkan efisiensi logistik dan distribusi bahan baku. Oleh karena itu, mengoptimalkan strategi manajemen persediaan menggunakan FIFO sangat disarankan untuk mendukung kelancaran operasional dan meningkatkan kinerja logistik di PT Indofood Sukses Makmur Tbk, Divisi Bogasari.

Kata kunci: *Sistem persediaan FIFO; efektivitas pengendalian persediaan; kinerja pengiriman gandum; efisiensi logistik; analisis regresi linier sederhana*.

INTRODUCTION

Effectiveness is a corporation's ability to achieve its predetermined goals. Corporations also strive to achieve one of these goals. Experts define effectiveness. In his work, Kosasih defines effectiveness as the ratio of an activity's input to its output in relation to achieving

predetermined goals, measured in terms of quantity, volume, or time. According to Beni (2016), a company's effectiveness is the extent to which its policies, processes, and outputs meet or exceed its objectives. An action is considered effective in the public sector if it significantly increases the organization's capacity. Besides, according to experts, inventory is a company's assets ready for sale or used in the production process to produce goods for sale. Thus, inventory is a crucial asset component for corporations because it serves as a primary source of revenue and profit. (Swasono & Prastowo, 2021).

Inventory is a current asset that requires effective management. To calculate the acquisition cost and value of inventory to be recorded on the balance sheet, effective inventory management is crucial for organizations that maintain merchandise inventory. Goods stored and sold in the business process, along with materials used in production or stored for other reasons, are all represented in inventory. (Yulientinah & Siregar, 2021). The development of Indonesia's economic system is inseparable from the role of prominent Indonesian economic figures. In our country, many figures have been highly influential. The development of the national economic system. An economic system is the structure of various economic elements that interact to achieve a common goal: the fulfilment of material needs. Therefore, each country has a different economic system, tailored to its respective national policies and goals. (Labetubun, 2021). Industrialization is the process of transforming basic resources into finished goods of higher value. Various activities that use industrial resources to produce more valuable or useful goods are included in industry according to Law No. 3/2014 concerning Industry. Meanwhile, industries such as food, textiles, and the internet are examples of large-scale commercial operations defined as "industry" in Webster's New World Dictionary. The term "industry" is often used to describe groups of businesses working together to provide products and services with the goal of improving the economy and generating profits. (Harahap et al., 2023)

In warehouses, handling large quantities of goods requires good conditions and procedures to ensure smooth operation. Companies must employ warehouse methods. Some methods include FIFO (First In First Out) and LIFO (Last In First Out), among others. At PT. ISM Div. Bogasari uses the FIFO method, which requires the first goods received to be issued or used for production first. Consequently, inventory records are reported in the same way as the stock in the warehouse. The FIFO method, also called the First In First Out (MTKP) method in Indonesian, is used to determine the earliest date of delivery. This method determines inventory value based on raw materials. To improve the quality of shipping or transferring goods, companies must certainly advance technology, and one of these technological advances is the existence of IT. Now, many companies, including PT. ISM Tbk Div. Bogasari, use the SAP (System Application Product) application for a job. In the system running at PT. ISM Div. Bogasari delivers or receives wheat for production by recording the type of wheat requested, the wheat sent to the production site or mill, and the wheat that has been processed and will be produced in data using Microsoft Excel and applications created by the company. In the process of sending wheat from the wheat silo, it will also be recorded manually by writing an order in the Daily Activities Report. In addition, wheat delivery is carried out according to the company's RTP (Production Target Plan). When the wheat delivery process is complete, the employee on duty will confirm with the production site how much wheat has entered the production site and re-record the wheat stock in the warehouse or silo using or with existing applications. Therefore, the aim of this research is to know the relationship between the effectiveness of the FIFO inventory method (X) and wheat delivery to the mill (Y).

METHOD

This study uses quantitative research to analyze the effectiveness of the FIFO inventory method for wheat shipments to the mill. This research is a descriptive quantitative study because its

purpose is to systematically, factually, and accurately present the results of data processing in numerical form. This research focuses on understanding the conditions of the research object at PT. Indofood Sukses Makmur Tbk. Bogasari Division.

Quantitative research is a research approach that uses numerical data and statistical analysis to test hypotheses, draw conclusions, and understand the relationships among the variables under study. By using systematic, impartial scientific methods, quantitative research aims to collect measurable data, analyze it using statistical techniques, and draw conclusions. (Susanto, 2024).

Descriptive research is a method used to study problems in society or specific situations. This research method seeks to describe the object or subject. (Syahrizal & Jailani, 2023).

The sample size for this study was 100 people. In this study, the author used the Slovin formula to collect the sample. The Slovin formula is as follows:

$$n = \frac{N}{1+Ne^2}$$

Description:

n = Number of Samples

N = Population

e = Percentage (%) of tolerable inaccuracy due to sampling error.

In the Slovin Formula, the percentage (e) is as follows:

a. Value (e) = 0.1 (10%) for a large population

b. Value (e) = 0.2 (20%) for a small population

The sample size that can be taken using the Slovin technique is between 10% and 20% of the research population.

Because this research population consists of 100 people, a 10% sample is used, and the results are rounded for simplicity. To determine the research sample, the following calculations are performed:

n = 100

1 + 100 (0.1)2

n = 100 = 50; The results obtained were 50 respondents.

2.01

Based on the results above, the sample of respondents for this study was adjusted to 50 individuals, consisting of Jetty & Silo employees. The Bogasari Division has been equipped to facilitate data processing and optimize test results.

Data Collection Techniques

The process of testing hypotheses by dividing the data into key components is called data analysis. This simplifies the data, making it easier to read and interpret. The data collection techniques used by the researcher in this study are as follows:

1. Library Search
   This research process involves collecting data and information through literature studies using various library resources. This includes reference books, previous research, articles, notes, and various related journals, thus facilitating research activities. (M. Sari & Asmendri, 2020).
2. Field Research.
   Field research is conducted at a location or place relevant to the research object to collect data directly. The following can be done during field research:

a. Observation, which is a systematic and structured process of observing and collecting data and information about specific objects and phenomena. In this research, the location is used as the
b. Observation of PT. Indofood Sukses Makmur Tbk, Bogasari Division.
c. Questionnaire is a method of collecting data or information by which respondents collect data. The questionnaire questions were structured according to established indicators. The questionnaire was addressed to employees of the jetty and silo division of PT. Indofood Sukses Makmur Tbk, Bogasari Division.

Documentation: This is the process of collecting data by documenting everything during the research, from procedures to necessary notes.

Data Analysis Techniques

Data analysis is a process that details formal efforts to identify themes, formulate hypotheses (ideas), and help provide themes for hypotheses (Sugiyono, 2018).

The data analysis used in this study was descriptive quantitative. This analysis method aims to simplify the data, make it easier to read, and interpret. The analysis techniques used by the researcher are:

1. Validity Testing

   Factor validity is assessed by correlating factor scores with total factor scores. If there is more than one factor, item validity is assessed by correlating item scores with factor scores and with total factor scores. The resulting correlation coefficient is used to assess an item's validity. Research items that have a significant correlation with the total score are considered valid and suitable for use in research. Significance tests are typically used to determine their feasibility. In validity testing, the most common methods used in SPSS are the Bivariate Pearson correlation (Pearson Product-Moment) and the Item-Total Correction correlation. (Anggraini et al., 2022)

   Validity is the term used to refer to the validation of a procedure carried out by system designers or users to collect data to support conclusions. However, validity is defined as the accuracy of a measuring instrument in measuring its intended purpose. Validity testing aims to determine whether a questionnaire is valid. Validity testing must consider the instrument's content and usability.

   In validity testing, each question or statement is evaluated based on the responses given for each variable. This process involves comparing the r value (Pearson Correlation) to the r values in the table. The calculated r value is used to determine whether a research question is valid. By comparing the calculated r value with the r value in the table, it is possible to determine whether the research questions are valid. (Darma, 2021)

   To determine the calculated r value, use the value in the Pearson Correlation row. Meanwhile, the tabular R value is obtained by using the df in the column, calculated as N-2, where N is the number of respondents. The following are the validity test criteria:

   a. If calculated r > table r, then the research instrument is considered valid.
   b. If calculated r < table r, then the research instrument is considered invalid.

2. Reliability Test: reliability refers to the extent to which a measurement of a Phenomenon or data can provide stable and consistent results. when repeated. Reliability is a test of a measuring instrument's ability to be used, indicating the consistency of measurement results when repeated with the same data and the same instrument. (Taherdoost, 2018).

   The concept of reliability is defined as the extent to which the measurement results are reliable and unaffected by measurement error. Essentially, reliability testing is conducted by comparing the Cronbach's alpha value with a significance level, which can range from 0.5 to 0.7, each adjusted to suit the research needs. The examination criteria are as follows:

a. If the Cronbach's alpha value is greater than the significance level, the instrument is considered reliable.
b. If the Cronbach's alpha value is less than the significance level, the instrument is considered unreliable.

To test validity and reliability, the Statistical Product and Service Solution (SPSS) software program uses significant measurement tools for item scores and total scores, indicating that the associated scores are valid. This is part of the analysis process, which has the ability to access and read various types of data and enter them into the system.

Classical Assumption Test

The classical assumption test is a requirement for linear regression analysis. This test is conducted to ensure that the regression equation used is appropriate and valid. The purpose of the classical assumption test is to ensure that the obtained regression equation has an optimal level of accuracy. The classical assumption test includes the following:

1. Normality Test
   The normality test is conducted to assess whether the confounding variables or residuals in the regression model are normally distributed, using the Kolmogorov-Smirnov test. The criteria are: if the significance value is >0.05, the data are not normally distributed; if it is <0.05, the data are normally distributed. (Sholihah, 2023)
   The residual normality test assesses whether the residuals from a regression are normally distributed. A good regression has normally distributed residuals. The following are the requirements for making a decision regarding the residual normality test:
   a. The residual values of the data are normally distributed if the 2-tailed Asymp Sig value is >0.05.
2. Linearity Test
   The linearity test aims to understand the relationship between variables and determine whether the relationship meets the linear assumption. This means that if a change occurs in variable X, it will be followed by a change in variable Y. Linearity is generally used as an analytical tool and is a requirement when conducting data analysis. (Nasar, 2024) The linearity test uses two variables that exhibit a significant linear relationship between X and Y. The decision-making guidelines for the linearity test are as follows:
   a. There is a significant linear relationship between variables X and Y if the Deviation from Linearity Sig. > 0.05.
   b. There is no significant linear relationship between variables X and Y if the Deviation from Linearity Sig. < 0.05.
3. Heteroscedasticity Test
   Heteroscedasticity is a condition where there is inequality in the residual variances for each observation in the regression model. This is analyzed to identify differences in variances. The heteroscedasticity test is used to determine whether the variances of the observations differ across the regression model. If the residual variances remain constant from one observation to another, it is called homoscedasticity, while if the variances differ, it is called heteroscedasticity. (Suhaila et al., 2021) The decision-making guidelines for the heteroscedasticity test are as follows:
   a. If the significance value (Sig) is > 0.05, then there is no heteroscedasticity.
   b. If the significance value (Sig) is < 0.05, then there is a heteroscedasticity symptom.

Data Analysis Method

Data analysis is the process of transforming data into new information so that data attributes are easier to understand and more useful for solving a problem. (Ulfah et al., 2022). The process

of analyzing data by dividing it into meaningful parts is called data analysis. In this study, the method used was simple linear regression, an approach for relating a dependent variable to an independent variable. In simple regression analysis, changes in variable X are followed by changes in variable Y. However, changes in variable X will not be followed by variable Y in a non-linear manner (Muhartini, 2021).

DISCUSSION

The results of this study present the relationship between the effectiveness of the FIFO inventory method (X) and wheat delivery to the mill (Y), the two main variables. Prior to conducting the study, the researcher conducted a pilot test of the instrument to ensure its validity and reliability. The trial results showed that all items in the FIFO inventory effectiveness questionnaire were valid, as indicated by the calculated r-values exceeding the r-table values. Furthermore, the reliability test results also showed a high value of 0.827, indicating that the questionnaire was reliable. Thus, the FIFO inventory effectiveness questionnaire is suitable for use in research and can be relied upon to collect accurate data.

Table 1. Reliability Test Results

Reliability Test Results	**Reliabilitas Coeficient**	**Cronbach's Alpha**	**Keterangan**
Reliability Test Results	5 statement items	0.827	Reliable
Reliability Test Results	3 statement items	0.693	Reliable

Based on the analysis results presented in the table above, the (α) value for the FIFO Inventory Effectiveness (X) variable is 0.827. Meanwhile, the (α) value for the wheat delivery to the mill variable (Y) is 0.693. Both (α) values indicate that the reliability test results for both variables are greater than 0.60, the minimum threshold for declaring an instrument reliable.

The results of the wheat delivery to the mill questionnaire indicate that it is valid, as the calculated r-value exceeds the tabled r-value. Furthermore, the reliability test results also show a high value of 0.693. Based on these results, the questionnaire on wheat delivery to the mill can be used as a data collection tool. The analysis of the research results indicates a positive relationship between the FIFO inventory effectiveness method and wheat delivery to the mill. This is demonstrated in the data processing regression equation Y = 4.295 + 0.409X. This means that as the independent variable increases, the dependent variable increases as well.

The t-test results obtained showed a calculated t-value of 7.420, while the t-table value was 2.010. This indicates that the calculated t-value exceeds the t-table value. Therefore, it can be concluded that H0 is rejected and Ha is accepted, indicating that the effectiveness variable (X) has a positive effect on the wheat delivery to the mill variable (Y). Furthermore, the coefficient of determination test revealed an R value of 0.730 and an R-squared value of 0.533. Therefore, it can be concluded that the independent variable (FIFO inventory effectiveness) has a 53.3% effect on the dependent variable (wheat delivery to the mill).

Table 2. t-test results

Coefficients					
Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	4.295	1.191		3.606	.001
Efektivitas Persediaan Metode FIFO (X)	.409	.055	.730	7.402	.000

The results of the regression analysis show that variable X has a significant influence on the dependent variable Y. This is evidenced by the calculated t value of variable x of 7.420 > 2.010. In addition, the significant value of variable X also shows that the influence of variable X on Y is significant. So H0 is rejected and Ha is accepted, meaning that variable X has a positive effect on Y.

Table 3. Results of the Coefficient of Determination Test

Model Summary[b]				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.730[a]	.533	.523	1.062

The table above shows a correlation value of 0.730. The coefficient of determination (R-Square) is 0.533. Therefore, it can be concluded that the independent variable (FIFO inventory effectiveness) has a 53.3% effect on the dependent variable (wheat delivery to the mill).

The FIFO (first-in, first-out) method significantly impacts warehouse inventory and wheat delivery to the mill. When the FIFO method is not functioning properly, it will affect shipping and inventory processes. Furthermore, when the FIFO method functions smoothly and effectively, the shipping and inventory processes become more efficient and optimal. Therefore, the FIFO method is an effective way to deliver wheat to the mill and also improves inventory effectiveness.

CONCLUSION

Based on the analysis and discussion, it can be concluded that the effectiveness of theFIFO (First In First Out) inventory method has a significant impact on the wheat delivery process to the mill at PT Indofood Sukses Makmur Tbk, Bogasari Division. The FIFO method has been proven to maintain wheat quality by ensuring that raw materials stored longer are used first, thereby minimizing the risk of damage and quality degradation. Furthermore, FIFO also increases storage efficiency, streamlines the flow of raw materials into the production process, and minimizes the risk of delivery delays. Therefore, the company needs to continuously monitor, evaluate, and improve the implementation of the FIFO method to ensure it remains effective and meets operational needs in the wheat milling division.

REFERENCES

Agustin, T. T. (2022). Penerapan Metode FIFO (First In First Out) dalam Pengendalian Persediaan Barang. *Jurnal Bisnis, Logistik Dan Supply Chain (BLOGCHAIN)*, *2*(2), 92–102.

Anggraini, F. D. P., Aprianti, A., Setyawati, V. A. V., & Hartanto, A. A. (2022).

Pembelajaran statistika menggunakan software SPSS untuk uji validitas dan reliabilitas. *Jurnal Basicedu*, *6*(4), 6491–6504.

Anuraga, G., Indrasetianingsih, A., & Athoillah, M. (2021). Pelatihan pengujian hipotesis statistika dasar dengan software r. *BUDIMAS: Jurnal Pengabdian Masyarakat*, *3*(2), 327–334.

Atika, A. N., Rasyid, H., & Tua, D. S. S. E. O. (n.d.). A. Status Sosial Masyarakat 1. Pengertian Status Sosial Masyarakat. *PENGARUH TINGKAT PENDIDIKAN TERHADAP STATUS SOSIAL MASYARAKAT DESA SUMBER BAHAGIA KECAMATAN SEPUTIH BANYAK LAMPUNG TENGAH*, 9.

Darma, B. (2021). *Statistika Penelitian Menggunakan SPSS (Uji Validitas, Uji Reliabilitas, Regresi Linier Sederhana, Regresi Linier Berganda, Uji t, Uji F, R2)*. Guepedia.

Daruhadi, G., & Sopiati, P. (2024). Pengumpulan Data Penelitian. *J-CEKI: Jurnal Cendekia Ilmiah*, *3*(5), 5423–5443.

Girsang, A. P., & Sinuraya, B. (2018). Analisis Perancangan Prototype Internet of Things (Iot) Pada STMIK Neumann. *PUBLIKASI ILMIAH TEKNOLOGI INFORMASI NEUMANN (PITIN)*, 1–5.

Harahap, N. A. P., Al Qadri, F., Harahap, D. I. Y., Situmorang, M., & Wulandari, S. (2023). Analisis Perkkembangan Industri Manufaktur Indonesia. *El-Mal: Jurnal Kajian Ekonomi & Bisnis Islam*, *4*(5), 1444–1450.

Irawan, M. D., & Simargolang, S. A. (2018). Implementasi E-Arsip pada program studi teknik informatika. *(JurTI) Jurnal Teknologi Informasi*, *2*(1), 67–84.

Labetubun, M. A. H., Kembauw, E., Hasan, M., Arifudin, O., Yulistiyono, A., Maulina, D., Tanjung, R., Nopralia, S., Hasanuddin, H., & Mustamin, S. W. (2021). *Sistem Ekonomi Indonesia*.

Latief, A., Rosalina, D., & Apiska, D. (2019). Analisis hubungan antar manusia terhadap kinerja karyawan. *Journal of Education, Humaniora and Social Sciences (JEHSS)*, *1*(3), 127–131.