Total Just-in-Time: An Empirical Study of Interelationship toward Operational Performance of Manufacturing Entities

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Abstract

This study aims to analyze the effect of Total Just In Time (which consists of Just In Time Production, Just In Time Purchasing, and Just In Time Selling) on Operational Performance. The sample used was 73 employees in the production department at PG Kebon Agung Malang from a total population of 220 employees, sampling using the simple random sampling method and for sampling using the Slovin formula approach. Data were analyzed descriptively and inferentially using validity and reliability tests, multiple linear regression, as well as t-test and F-test. The results showed that the implementation of Total Just In Time as a whole had a positive and significant effect on Operational Performance. Partially, the three Just In Time variables also had a significant effect, with Just In Time Purchasing being the variable that had the most dominant effect. This shows that timely, efficient, and planned management of raw material purchases is an important factor in increasing the efficiency of the production process, reducing waste, and maintaining product quality. These findings support previous theories and research regarding the strategic role of the Just In Time system in supporting the improvement of the company's operational performance.

INTRODUCTION

In dynamic business environment to day, organizations are forced by the competitive landscape to compete through their own capabilities and their supply networks. The emphasis on lean manufacturing is to eliminate waste in the supply chain for global competitiveness and to increase the need for Just In Time (JIT) supply chains to become more efficient. The philosophy of JIT and related practices are often considered key in the supply chain when the practice is extended outside the organization. Therefore, several studies consider several total Just In Time (T-JIT) including JIT production, JIT purchasing, JIT sales, which cover both internal and external supply chains and investigate the impact felt by the organization (Hidayat et al., 2025).

The essence of Just In Time literally means just in time, this philosophy has been widely used in Japanese industry by utilizing the ability of raw material and component suppliers to deliver orders on time and eliminating all non-essential or non-value-added activities. JIT's role in improving performance has been widely investigated. The impact of JIT is investigated specifically by measuring the influence of lean practices because JIT is one of the important aspects of lean manufacturing.

Operational performance is the result achieved by an organization in terms of the efficiency and effectiveness of its operational processes, which are usually measured using indicators of productivity, quality, delivery speed, reliability, and flexibility (Panigrahi et al., 2022). Operational performance refers to two main dimensions: efficiency, which indicates how well a company utilizes resources to produce a product. The other dimension is responsiveness, which indicates how quickly and flexibly a company responds to changes in customer demand.

Based on the Claycomb et al. (1999) model, there are several dimensions of JIT in manufacturing companies: JIT sales, JIT purchasing, and JIT production. JIT production is a repetitive production system in which the processing and movement of materials and goods occurs according to needs in small quantities. JIT sales is the ability to build value in every sales process based on the organization's ability to deliver flawless quality, zero-variety quantities, on-time delivery, and the ability to minimize total waste and costs across production and marketing. JIT purchasing is a frequent release and delivery process, where buffer inventory is maintained at zero through continuous, one-by-one deliveries from suppliers to end-users (Lorenza, et al., 2024).

There is a previous study presented by Pattayet al (2021), stating that there is a positive impact of JIT sales on external JIT which includes JIT purchasing and JIT sales in terms of capability, the results obtained that the success of external JIT depends on internal JIT. Based on the research background, identification of problems and literature review that have been described, it can be concluded that JIT has an influence on the operational performance of a Company. With several results of studies that have been conducted by previous studies, there are still few that test operational performance variables with JIT, therefore researchers are interested in studying the effect of Total Just In Time on Operational Performance. The purpose of this study is to analyze the effect of total just in time on operational performance and which of the just in time components has a dominant influence.

LITERATURE REVIEW

Total of Just In Time

The term Just In Time literally means on time. This concept leverages the ability of raw material or component suppliers to deliver orders exactly when needed, while eliminating all non-essential or non-value-added activities. According to Silvia (2021), Just In Time is a manufacturing philosophy that plays a crucial role in cost management. JIT emphasizes eliminating waste, reducing inventory, building strong relationships with suppliers, increasing employee participation, and developing programs focused on customer satisfaction.

According to Fauzi (2021), Just In Time is a business philosophy focused on reducing production time, both in manufacturing and non-manufacturing processes. Just In Time is a production system that only purchases raw materials in the quantities actually needed to meet customer demand. The Just In Time method is a demand-pull production system that aims to reduce waste by only producing goods when needed and in the quantities requested by customers.

Meanwhile, Pattay (2021) stated that Just In Time (JIT) is a production system in which raw material purchases and production processes are carried out solely to meet customer demand. Based on the opinions of the experts mentioned above, it can be concluded that the JIT system is a philosophy and production system that focuses on efficiency by minimizing waste by producing products in the right quantity, the right quality, and at the right time.

The Just-In-Time system emerged in Japan as a solution to limited natural resources, dependence on imports, and unfavorable geographic conditions. To remain competitive, Japan innovated by reducing waste of materials, labor, time, and costs, and optimizing factory layouts due to limited land. This concept was developed by Taiichi Ohno of Toyota in the 1970s, with the goal of producing high-quality products, minimizing defects, and keeping inventory to a minimum.

Toyota Motor Company's success in implementing the Just In Time system attracted the interest of many other companies in Japan because it was able to minimize inventory. Over time, the implementation of JIT expanded to large companies in Japan such as Ford, Chrysler, General Motors, and Hewlett Packard. Even non-manufacturing sectors such as McDonald's fast food restaurants adapted JIT principles through the "Made For You" system to serve fresh produce in a short time. Currently, JIT continues to grow and is used not only by large companies, but also by small businesses, with a focus on maximizing inventory reduction.

Operational Performance

Increasingly fierce competition in various industrial sectors is driving organizations to implement more modern and efficient management methods and tools. The goal is to increase market share, obtain and maintain a competitive advantage, and support the selection, implementation, and evaluation of strategies. Farmansjah et al. (2022) state that operational performance measurement is an approach used by organizations to understand and control their business activities. Restaurants consistently strive to evaluate performance to obtain relevant information on the products and services offered, as well as on their internal activities and processes. Organizations recognize that when operational activities are properly directed, their ability to achieve targets, meet customer expectations, and provide information that supports managerial decision-making will significantly increase. Silvia (2021) describes performance as a series of administrative behaviors demonstrated when a worker carries out their duties, including aspects of work quality, effective implementation processes, technical abilities, and skills appropriate to the job. Meanwhile, Fauzi (2021) views performance as the specific results of a behavior;

negative performance indicates an undesirable outcome, while positive performance reflects the achievement of expected outcomes. Performance is the implementation of work responsibilities in accordance with the specified workload and standards.

Silvia (2021) emphasizes that the concept of operational performance encompasses standards or criteria for measuring an organization's operational performance through market share or the supply and demand for the organization's products or services. Operational performance is also a process that links strategic objectives with operational goals. Operational performance describes the stages, functions, and success mechanisms that align with the organization's strategic plan; it also encompasses a comprehensive plan detailing the financial and human resources required to carry out specific tasks and activities, including budgeting, production volumes, and work schedules.

Researchers have differing views on defining operational performance, depending on the approach used. Some view it as a set of objectives and foundations, while others examine it from a financial perspective. In the same context, some researchers view operational performance as a set of principles and policies aimed at achieving superior performance at the lowest possible cost. In conclusion, operational performance is a set of objectives and foundations that all companies strive to achieve at minimal cost.

Operational performance has several dimensions consisting of competitive priorities such as quality, on-time delivery, flexibility, and cost efficiency. These dimensions are used as a tool to assess the extent to which an organization's operational performance is operating optimally (Fauzi, 2021). Operational performance refers to the achievement of an organization's targeted results. Furthermore, this dimension helps measure the extent to which an organization can formulate and achieve its objectives through the appropriate and efficient use of available resources. This performance also demonstrates how an organization manages and optimizes the use of its human and material resources to achieve established goals. Operational performance can be evaluated through indicators such as cost efficiency, service or product quality, and delivery speed.

According to Ulviyatul (2023), operational performance indicators include: unit production costs, on-time delivery, customer support and service, product innovation, conformance to product specifications, and product quality and performance.

Hypothesis Development

Hypothesis one is based on previous research conducted by Suriyanti (2021). The results of that study stated that Just-in-Time Production, Just-in-Time Purchasing, and Just-in-Time Selling simultaneously have a significant impact on operational performance. Furthermore, research by Farmansjah et al. (2022) showed that Just-in-Time Production and Just-in-Time Purchasing can increase company productivity. Therefore, Hypothesis 1 predicts a positive and significant influence between the implementation of Just-in-Time Production, Just-in-Time Purchasing, and Just-in-Time Selling on the Operational Performance.

Hypothesis two is based on research conducted by Wiyasa (2024). The results of this study indicate that Just in Time Production has a significant impact on operational

performance. Therefore, Hypothesis 2 (H2): a positive and significant impact of the implementation of Just in Time Production on the operational performance.

Hypothesis three is based on previous research conducted by Purwantini & Saputro (2019). The results of that study showed that Just in Time Purchasing has a positive and significant effect on company quality performance. Further research conducted by Hidayat et al. (2024) showed that Just in Time Purchasing has a positive effect on operational performance. Therefore, Hypothesis 3 (H3): a positive and significant effect of the implementation of Just in Time Purchasing on the operational performance.

Hypothesis four is based on research conducted by Hidayat et al. (2024). The results of that study indicated that the implementation of Just in Time Selling has a positive effect on operational performance. Furthermore, research conducted by Suriyanti (2021) found that Just in Time Selling has a significant impact on operational performance. Therefore, Hypothesis 4 (H4): a positive and significant effect of the implementation of Just in Time Selling on the operational performance.

Meanwhile, hypothesis five is based on research by Fauzi (2021). The results of the study stated that Just in Time Purchasing has a dominant influence on Operational Performance, with the highest value obtained between Just in Time Production and Just in Time Selling, namely 0.659. Therefore, hypothesis 5 (H5): a dominant influence of the implementation of Just in Time Purchasing on the Operational Performance.

RESEARCH METHODS

This study uses the independent variable, namely Total Just in Time (X) which consists of Just in Time Production (X1), Just in Time Purchasing (X2), and Just in Time Selling (X3). Then, the dependent variable in this study, namely Operational Performance (Y). Just in Time Production is a production strategy that can be applied in modern industrial systems with the aim of reducing waste by implementing continuous improvement. In management strategies, Just in Time Production can integrate the entire production chain, starting from engineering, ordering raw materials from suppliers, raw material management, manufacturing processes, to product distribution. This aims to increase production efficiency and create customer satisfaction. In Just in Time Production, the company will only produce goods needed by consumers, in the required quantity and at the required time. According to Hidayat, et.al. (2024) there are several indicators of Just in Time Production, including; Minimizing inventory in the supply chain. Implementation of the Kanban system, Employee participation and involvement and Just in Time Purchasing.

Furthermore, according to Wiyasa (202), Just in Time Purchasing is a purchasing strategy implemented in industrial production systems that emphasizes the timely procurement of raw materials. This means that raw materials arrive only when needed during the production process, in small, frequent quantities, rather than in large quantities and stored for long periods. Just in Time Purchasing aims to reduce waste and avoid inefficiencies in the purchasing process and raw material inventory management. This includes reducing excessive inventory waste, storage costs, storage space, and the risk of raw material damage. Wiyasa (2024) explains the indicators of Just in Time Purchasing,

including: purchasing in specific quantities, number of suppliers, long-term relationships with suppliers, supplier support, control of the transportation system, and efficiency in raw material handling.

According to Suriyanti (2011), Just in Time Selling is a time-based sales strategy aimed at delivering products or services to consumers on time, in the right quantities, at the right location, and without any defects. Just-in-Time Selling has various objectives, such as maximizing customer satisfaction by providing timely and accurate service, improving operational efficiency in the sales function, and supporting the company's financial performance by reducing costs and increasing the speed of product flow to market. According to Wahyumi(2020), Just-in-Time Selling consists of several indicators, including: On-time delivery, product quantity accuracy, product defect rate, response time to customer requests, customer satisfaction level, and finished product inventory.

Operational Performance: Ghazani & Wibowo (2021) define operational performance as a company's ability to compete effectively, continuously improve product or service quality, and maintain existing advantages over the long term. According to Ulviyatul (2023), operational performance indicators include: unit production costs, on-time delivery, customer support and service, product innovation, product specification compliance, and product quality and performance.

This research has a scope related to operational management that discusses Total Just in Time where Total Just in Time consists of Just in Time Production, Just in Time Purchasing, and Just in Time Selling and discusses Operational Performance. Based on the scope of the research, this research analyzes the effect of Total Just in Time on Operational Performance at PG. Kebon Agung Malang which explains more specifically with the Location in conducting this research, namely at PG. Kebon Agung Malang which is located on Jalan Raya Kebon Agung, Sonosari, Kebon Agung, Kec. Pakisaji, Kab. Malang, Malang, East Java, 65162. The population in this study were employees in the production department as many as 220 employees. This number became the population in this study. The number of samples in the study was taken using the Slovin calculation method. Thus, the sample in this study was 73 employees who work at PG. Kebon Agung Malang.

This study uses quantitative data collection and then numerical or statistical analysis to answer the problem statement or test the hypothesis. According to Amruddin et al. (2022), quantitative research is based on the philosophy of positivism, which means that reality is objective, fixed, and measurable. The focus of quantitative research is on a specific group, either the entire population or a portion or sample deemed representative. This study uses primary data obtained by distributing questionnaires to respondents or employees working at the Kebon Agung Sugar Factory in Malang. Primary data is data obtained directly and collected according to variables related to predetermined indicators. This primary data will be processed using quantitative and statistical analysis to test the research hypothesis.

This study also uses primary data collection through questionnaires. Questionnaires are a data collection method that provides respondents or employees working at the Kebon Agung Sugar Factory in Malang with a set of predetermined

statements based on indicators of the variables being studied. By distributing questionnaires, researchers will be able to collect data relevant to the objectives of this study. The data collected through the questionnaires will be measured using a Likert scale with a score of 1-5.

The collected data will be processed and analyzed. The data will be processed using computer software. This data processing tool is called IBM SPSS Statistics 22. The following are the data analysis techniques used in this study: descriptive analysis, which is a technique used to describe or summarize the collected data without drawing broader conclusions or generalizations. The goal of descriptive analysis is to provide a more systematic and factual overview of the data's characteristics (Sugiyono, 2020). The purpose of using statistical analysis techniques in this study is to examine the extent of the influence of the Total Just-in-Time variable, consisting of Just-in-Time Production, Just-in-Time Purchasing, and Just-in-Time Selling, on Operational Performance at the Kebon Agung Sugar Factory in Malang.

Validity testing is used to measure how precisely and accurately an instrument measures what it is supposed to measure in a study (Qulub, 2023). In this study, validity testing was used to assess each instrument created for each variable in the questionnaire to determine whether it aligns with the research concept. The criteria for assessing validity testing in this study are:If the calculated r > r table with a significance level of 0.05, the instrument is declared valid. If the calculated r < r table with a significance level of 0.05, the instrument is declared invalid.

Qulub (2023) defines reliability testing as a technique used to evaluate the consistency of items in a research instrument, namely by examining the extent to which the research items can produce stable and consistent results when used under the same conditions and repeatedly. Reliability testing is measured using Cronbach's Alpha, with the criteria that a value > 0.60 is considered reliable, but a value < 0.60 is considered unreliable.

Next, the Classical Assumption Test: First, the normality test is a statistical technique used to determine whether the distribution of data is normal. The one-tailed Kolmogorov-Smirnov test can be used to test for normality. Data are normally distributed if the significance level is greater than 0.05, but if the data is not normally distributed, the significance level is less than 0.05.

Multicollinearity Test: The multicollinearity test is a classic assumption test used to evaluate whether there is a correlation between independent variables. If multicollinearity occurs between independent variables, the estimated regression coefficients become unstable, and the interpretation of each independent variable becomes inaccurate. If the tolerance value is <0.10 and the VIF value is >10, then the independent variable is correlated with the other independent variables, or in other words, multicollinearity occurs. However, if the tolerance value is >0.10 and the VIF value is <10, then the independent variable is not correlated with the other independent variables, or multicollinearity does not occur.

Heteroscedasticity Test: The heteroscedasticity test is used to determine whether the residual variance in a regression is consistently distributed. Several methods can be

used to test for heteroscedasticity, including scatterplots, histograms, and P-plots. In this study, the P-plot was used to test for heteroscedasticity. If the points on a graph are randomly distributed and follow the diagonal line without forming a specific pattern, heteroscedasticity does not occur. However, if the points on the graph form a specific pattern, heteroscedasticity occurs.

Multiple linear regression analysis is a statistical technique used to estimate or measure the effect of two or more independent variables on a dependent variable. The purpose of multiple linear regression analysis is to determine the extent of the functional relationship between the independent variables and the dependent variable. This analysis uses the following formula:

Y = a + b1.x1 + b2.x2 + b3.x3 e

Keterangan:

Y	= Variabel Kinerja Operasional
a	= Konstanta
b1.b2.b3	= Angka arah koefisien regresi
x1	= Variabel Just in Time Production
x2	= Variabel Just in Time Purchasing
x3	= Variabel Just in Time Selling
e	= Error term

Simultaneous Test (F Test): A simultaneous test is a method used to simultaneously test the effect of independent variables on the dependent variable (Ariska, 2022). A simultaneous test uses the F test in regression analysis and provides a significance value (p-value) that is then used as a basis for decision-making. If the calculated F value is <F table (0.05), then Ha is rejected and Ho is accepted, meaning the independent variables collectively have no significant effect on the dependent variable. However, if the calculated F value is >F table (0.05), then Ha is accepted and Ho is rejected, meaning the independent variables collectively have a significant effect on the dependent variable.

Partial Test (t Test): A partial test is a method used to test whether the independent variables individually influence the dependent variable. A partial test uses a t-test in the regression analysis output. The partial test uses a significance level of 0.05, meaning it has a tolerance margin of error of 5%. If the significance value is <0.05 or the calculated t-value is >t-table, then the independent variable individually has a significant effect on the dependent variable. However, if the significance value is >0.05 or the calculated t-value is <t-table, then the independent variable individually does not have a significant effect on the dependent variable.

Coefficient of Determination (R2): The coefficient of determination is used to measure or determine the extent of the influence of the independent variable on the dependent variable, either simultaneously or partially. The coefficient of determination ranges from 0 to 1. If the coefficient of determination is 0, then the independent variable does not explain any variation in the dependent variable. However, if the coefficient of determination is 1, then the independent variable explains all of the variation in the dependent variable.

RESULTS AND DISCUSSION

Based on the validity test results, most of the statement items in the JIT Production (X1), JIT Purchasing (X2), JIT Selling (X3), and Operational Performance (Y) variables were declared valid. Also,b ased on the Reliability Test Results Table, all measured variables demonstrated a good level of internal consistency. The JIT Production variable (X1) had a Cronbach's Alpha value of 0.608, slightly above the critical value of 0.6, and therefore considered reliable. This indicates that the instrument used to measure JIT Production is quite consistent and reliable. Furthermore, the JIT Purchasing variable (X2) had a Cronbach's Alpha value of 0.689, also exceeding the critical value of 0.6. This indicates that the items in this variable have good internal consistency and can be used as a reliable measurement tool. Meanwhile, the JIT Selling variable (X3) showed a very high Cronbach's Alpha value of 0.858, indicating that the measurement instrument for this variable has excellent internal consistency and is therefore highly reliable. Similarly, the Operational Performance variable (Y) obtained a Cronbach's Alpha value of 0.858, indicating that the items in this instrument are also highly consistent and can be used with a high degree of confidence. Thus, it can be concluded that all measurement instruments for the variables in this study have an adequate to very high level of reliability, so that the resulting data can be considered consistent and trustworthy.

Further, Based on the Normality Test Results, the number of samples tested was 73, with an Asymp. Sig. value of 0.070. Based on the test criteria, if the Asymp. Sig. value is > 0.05, the data is considered normally distributed. In this case, because 0.070 is greater than 0.05, it can be concluded that the data tested are normally distributed. In other words, the data meets the assumption of normality, which is one of the main requirements in applying parametric statistical analysis techniques such as linear regression, ANOVA, and other tests. This indicates that the model used in the study has an appropriate data distribution basis, so the statistical analysis results are reliable and valid, supported by the P-Plot that neatly follows the axis line.

Then, the results of the multicollinearity test indicate that the JIT PRODUCTION variable (X1) has a Tolerance value of 0.945 and a VIF (Variance Inflation Factor) of 1.059. The JIT Purchasing variable (X2) has a tolerance value of 0.925 and a VIF of 1.081. Meanwhile, the JIT Selling variable (X3) has a tolerance value of 0.914 and a VIF of 1.094. Based on the multicollinearity test criteria, variables are declared free from multicollinearity if the tolerance value is greater than 0.1 and the VIF value is less than 10. Since all variables (JIT Production, JIT Purchasing, and JIT Selling) have tolerance values greater than 0.1 and VIF values less than 10, it can be concluded that there is no significant linear relationship between the independent variables in the model. This indicates that the regression model used is free from multicollinearity problems and is suitable for further analysis.

Multiple Linear Regression Analysis

Based on the primary data processing results, the following is a summary of the multiple linear regression analysis results.

Table 1: Results of the Multiple Linear Regression Analysis

Model	Unstandardized coefficients		Standardized Coefficients	T	Sig
	B	Std. Error	Beta		
Konstanta	40.571	10.335		3.926	0.000
JIT Production (X1)	-0.778	0.247	-0.307	-3.150	0.002
JIT purchasing (X2)	0.476	0.113	0.414	4.199	0.000
JIT selling (X3)	0.148	0.098	0.150	1.511	0.135

Source: Processed Primary Data, 2025

Based on the Multiple Linear Regression Analysis Results table, the variables JIT production X1), JIT purchasing (X2), and JIT selling (X3) have an influence on Operational Performance. JIT production (X1) has a significant influence on Operational Performance, indicated by a significance value (Sig) of 0.002, which is smaller than the significance level of 0.05. JIT purchasing (X2) also has a significant influence on Operational Performance, with a significance value (Sig) of 0.000, which is smaller than the significance level of 0.05. However, JIT selling (X3) does not have a significant influence on Operational Performance, because its significance value (Sig) is 0.135, which is greater than the significance level of 0.05. The regression equation obtained from the analysis is:$Y=40.571-0.778X1+0.476X2+0.148X3$

a = constant 40.571, meaning that if the variables JIT production (X1), JIT purchasing (X2), and JIT selling (X3) were zero, then the Operational Performance (Y) value would be 40.571. This indicates that without the contribution of JIT production, JIT purchasing, and JIT selling, Operational Performance would already have a baseline value of 40.571.

b1 = coefficient -0.778, meaning that if JIT production (X1) increases by 1 unit, assuming the variables JIT purchasing (X2) and JIT selling (X3) remain constant, then Operational Performance (Y) will decrease by 0.778 units. This regression coefficient is negative and significant, indicating that an increase in JIT Production actually tends to decrease operational performance. This could indicate certain limitations or conditions under which excessive or inappropriate implementation of JIT Production can have a negative impact.

b2 = coefficient 0.476, meaning that if JIT Purchasing (X2) increases by 1 unit, assuming JIT Production (X1) and JIT Selling (X3) remain constant, then Operational Performance (Y) will increase by 0.476 units. This regression coefficient is positive and significant, indicating that better implementation of JIT Purchasing will have a positive

impact on improving operational performance. For example, efficiency in Just In Time raw material purchasing can improve a company's operational efficiency.

b3 = coefficient 0.148, meaning that if JIT Selling (X3) increases by 1 unit, assuming JIT Production (X1) and JIT Purchasing (X2) remain constant, then Operational Performance (Y) will increase by 0.148 units. This regression coefficient is positive, but not statistically significant. This indicates that while there are indications of improved operational performance with the introduction of JIT Selling, the effect is not strong or consistent enough to be considered significant at the 0.05 confidence level.

Of the three JIT variables, only JIT Purchasing (X2) makes a positive and significant contribution to Operational Performance. JIT Production (X1) actually shows a significant negative effect, which requires further investigation into why this occurs. Meanwhile, JIT Selling (X3) has a positive effect, but it is not statistically significant. This suggests that focusing on improving JIT Purchasing will likely have the greatest positive impact on Operational Performance, while JIT Production's implementation may need to be re-evaluated.

Tabel 2. F Test

	Derajat Kebebasan	F_{hitung}	F_{tabel}	Sig.
Regresi	3	14.095	2.74	0.000
Residual	69			

Source: Processed Primary Data, 2025

Hypothesis testing was conducted using the F test. The results showed that the F count value was 14.095, while the F table at a significance level of α = 5%, with df1 = 3 (regression) and df2 = 69 (residual), was 2.74. Because the F count (14.095) was greater than the F table (2.74) and the probability value (Sig.) of 0.000 was much smaller than the significance level of α = 0.05, the hypothesis was accepted. These results indicate that the independent variables, namely JIT PRODUCTION (X1), JIT PURCHASING (X2), and JIT SELLING (X3), simultaneously had a significant influence on the dependent variable, namely Operational Performance (Y). Thus, the results of this statistical analysis provide strong evidence that the overall concept of Just In Time (through JIT PRODUCTION, JIT PURCHASING, and JIT SELLING) together play an important role in explaining variations in Operational Performance.

Table 3. t Test

Variabel	t_{hitung}	Sig.
JIT production (X1)	-3.150	0.002
JIT purchasing (X2)	4.199	0.000
JIT selling (X3)	1.511	0.135
Variabel terikat = Kinerja Operasional (Y)		

Source: Processed Primary Data, 2025

Based on the results of the t-test (partial), it was found that not all independent variables have a significant influence on Operational Performance (Y). For the JIT Production variable (X1), the t-value is -3.150 with a significance value of 0.002. Because the absolute value of t-value (3.150) is greater than t-table (1.995) and the significance value (0.002) is less than 0.05, it can be concluded that JIT Production (X1) has a significant negative influence on Operational Performance (Y). Furthermore, for the JIT Purchasing variable (X2), the t-value is 4.199 with a significance value of 0.000. With the absolute value of t-value (4.199) which is greater than t-table (1.995) and the significance value (0.000) which is less than 0.05, it shows that JIT Purchasing (X2) has a significant positive influence on Operational Performance (Y). However, for the JIT Selling variable (X3), the t-value is 1.511 with a significance value of 0.135. Because the absolute value of t-value (1.511) is smaller than t-table (1.995) and the significance value (0.135) is greater than 0.05, it can be concluded that JIT Selling (X3) does not have a significant influence on Operational Performance (Y). Thus, of the three Just In Time dimensions tested partially, only JIT Production and JIT Purchasing individually have a significant influence on Operational Performance.

Table 4. Uji Koefisien Determinasi (R^2)

Model Summary				
odel	R	R Square	Adjusted R Square	Std. Error of the Estimate
	.616a	.380	.353	2.987

Source: Processed Primary Data, 2025

Based on the Table "Results of the Determination Coefficient (R^2) Test", the determination coefficient (R Square) value is 0.380 or equivalent to 38.0%. This indicates that the independent variables (JIT PRODUCTION, JIT PURCHASING, and JIT SELLING) used in this regression model together influence the dependent variable (Operational Performance) by 38.0%. The remainder, namely (100% - 38.0% = 62.0%), is influenced by other factors not examined in this study, such as other variables that may also influence Operational Performance but are not included in the analysis of this regression model.

DISCUSSION

The first hypothesis states that the joint implementation of Just-In-Time Production, Just-In-Time Purchasing, and Just-In-Time Selling has a positive and significant impact on Operational Performance at the Kebon Agung Sugar Factory in Malang. This hypothesis aligns with this research, where the variables Just-In-Time Production, Just-In-Time Purchasing, and Just-In-Time Selling collectively have a positive and significant impact on Operational Performance at the Kebon Agung Sugar Factory in Malang. This statement also aligns with research conducted by Suriyanti (2021) and Farmansjah et al. (2022), which explains that Just-In-Time Production, Just-In-Time

Purchasing, and Just-In-Time Selling have a significant impact on Operational Performance and can increase company productivity.

Well-executed Just-In-Time Production can help increase company productivity. By implementing Just-In-Time Production, companies will only require raw materials that meet production needs, neither more nor less, thereby minimizing waste. Furthermore, Just-In-Time Production can help increase employee productivity. Employees will be productive or directly involved in daily production activities and increase efficiency in the production line. Then, Just In Time Purchasing can also help in arranging the delivery schedule of raw materials in a structured and planned manner. Thus, it can be ensured that it does not hamper production activities. In addition, the existence of Just In Time Purchasing helps companies to always check raw materials, to ensure there are no damaged or poor quality raw materials. Then, the implementation of Just In Time Selling also helps in improving Operational Performance. This can be proven that in this study found the implementation of Just In Time Selling helps in the delivery of products to consumers on time and ensures that the products sent are in good condition until they reach consumers. Thus, this can create a positive impact for the company, because consumers will place full trust in the company and can create value for a company.

This study found a significant impact of the implementation of Just-In-Time Production on Operational Performance at Kebon Agung Sugar Factory, Malang. These results align with research conducted by Suriyanti (2021), which stated a significant impact of the implementation of Just-In-Time Production on Operational Performance. These results indicate that when Just-In-Time Production is implemented properly, it has a positive impact on the company's Operational Performance. This demonstrates that the implementation of Just-In-Time Production at Kebon Agung Sugar Factory can help the company implement a kanban system to improve production efficiency. Furthermore, the company always purchases only the raw materials needed for the production process, thus preventing waste or shortages. The company also becomes more selective in choosing suppliers to obtain higher-quality raw materials, thus producing high-quality products. Furthermore, the implementation of Just-In-Time Production allows the company to establish long-term relationships with suppliers and maintain them for mutual benefit. This positive relationship is evidenced by the support from suppliers for Kebon Agung Sugar Factory. Kebon Agung, where suppliers always send raw materials with good quality and always provide a fast and positive response to company requests.

Addtionally, This study found that the implementation of Just-In-Time Purchasing had a positive and significant impact on Operational Performance at Kebon Agung Sugar Factory, Malang. This finding aligns with research conducted by Purwantini & Saputro (2019), which found that Just-In-Time Purchasing had a positive and significant impact on Operational Performance. Furthermore, research conducted by Zaid et al. (2016) also indicated that the implementation of Just-In-Time Purchasing had a positive impact on Operational Performance. The implementation of Just-In-Time Purchasing within a company facilitates the creation of a more detailed schedule for raw material deliveries from suppliers, allowing the company to better understand when production activities will resume. The implementation of Just-In-Time Purchasing at Kebon Agung Sugar Factory

has been implemented effectively, with the company continuously monitoring the delivery of raw materials for production. This monitoring ensures that the raw materials ordered from suppliers are in accordance with the specifications. In addition, the implementation of Just In Time Purchasing also helps companies in receiving raw materials through efficient procedures and managing raw materials with the aim of reducing waste. If a company orders raw materials that exceed production capacity, this will create losses for the company, because there will be unused raw materials that will fill the warehouse, create financial waste, and possibly the raw materials will be damaged. Therefore, the implementation of Just In Time Purchasing is very important in a company so that the company can further improve its Operational Performance so that it can provide or create products that suit consumer needs and can create consumer satisfaction.

Besides, this study found a positive and significant impact of the implementation of Just-In-Time Selling on Operational Performance at Kebon Agung Sugar Factory. These results align with research conducted by Zaid et al. (2016), which stated that Just-In-Time Selling has a positive impact on the Company's Operational Performance. At Kebon Agung Sugar Factory, the implementation of Just-In-Time Selling has been implemented well. This demonstrates that the implementation of Just-In-Time Selling has resulted in timely product delivery and good condition to consumers. Furthermore, the company consistently delivers products in the correct quantities, resulting in minimal consumer complaints. The company also consistently provides a quick and positive response to customer orders. The company is able to fulfill consumer requests. Providing good sales service to consumers can have a positive impact on the company, such as greater customer satisfaction with the company's products, resulting in continued positive feedback and fostering customer loyalty.

Also, this research hypothesis states that the implementation of Just-In-Time Purchasing has a dominant effect on Operational Performance. This hypothesis aligns with research conducted by Suriyanti (2016), which states that Just-In-Time Purchasing has a dominant influence on Operational Performance, with a greater value than other variables, namely Just-In-Time Production and Just-In-Time Selling. This hypothesis is also in line with this research, which found that Just-In-Time Purchasing has a dominant influence on Operational Performance compared to Just-In-Time Production and Just-In-Time Selling. This can be proven by the multiple linear regression analysis in the Unstandardized Coefficient Beta column, which shows that the Just-In-Time Purchasing variable is greater than the Just-In-Time Production and Just-In-Time Selling variables, with a Just-In-Time Purchasing value of 0.411. Meanwhile, the Just-In-Time Production value is -0.307 and the Just-In-Time Selling value is 0.150. Thus, based on the results of this study, it can be stated that the implementation of Just In Time Purchasing provides a more comprehensive influence on Operational Performance at PG. Kebon Agung Malang, both in terms of the number of suppliers, long-term relationships with suppliers, support from suppliers, purchasing raw materials in certain quantities, and efficiency in handling raw materials.

CONCLUSION

Based on the research results and discussions conducted in this study on the effect of raw material inventory control and production process planning on the smooth running of the production process at Kebon Agung Sugar Factory, the following conclusions can be drawn to address the research questions formulated in this study: The implementation of Total Just-In-Time (JIT), encompassing Just-In-Time Production, Just-In-Time Purchasing, and Just-In-Time Selling, at Kebon Agung Sugar Factory, Malang, has been effective and in line with modern operational management principles. Just-In-Time Production (JIT) is implemented to reduce waste through controlling raw materials according to production needs and ensuring labor efficiency. Just-In-Time Purchasing (JIT) is implemented to schedule timely and high-quality raw material deliveries, while Just-In-Time Selling focuses on accurate product distribution to consumers, maintaining product quality during delivery, and increasing customer satisfaction. Overall, the implementation of these three JIT aspects can support improved company operational performance, particularly in terms of production process efficiency, timeliness, and quality control.

The results of the study indicate that simultaneously, the three Just In Time variables, namely Just In Time Production, Just In Time Purchasing, and Just In Time Selling, have a positive and significant influence on Operational Performance at PG. Kebon Agung Malang. This proves that the integrated implementation of Total Just In Time is able to improve the effectiveness of the company's operational processes, increase productivity, and minimize waste. This finding is in line with previous theories and studies which state that the comprehensive implementation of JIT can improve the efficiency, quality, and competitiveness of company operations. Of the three JIT variables studied, Just In Time Purchasing is proven to have the most dominant influence on improving Operational Performance. This is based on the results of the regression analysis which shows the highest coefficient value is owned by this variable. This dominant influence indicates that timely, efficient, and quality management of raw material purchases is a key factor in supporting the smooth production process, cost control, and increasing company output. Good implementation of JIT Purchasing also encourages the formation of long-term and mutually beneficial relationships with suppliers, which ultimately contribute significantly to overall operational performance.

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