

To cite this article: Feliks A.B.K. Panjaitna and Sumiati (2025). Product Quality, Just In Time, And Cost Efficiency: The Role Of Management Information Systems. International Journal of Education, Business and Economics Research (IJEER) 5 (1): 119-131

PRODUCT QUALITY, JUST IN TIME, AND COST EFFICIENCY: THE ROLE OF MANAGEMENT INFORMATION SYSTEMS

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<https://doi.org/10.59822/IJEER.2025.5107>

ABSTRACT

The management information system is one of the aspects that determine cost efficiency, so the organization needs to have one in place, and this is crucial because businesses frequently overlook the importance of punctuality while supporting their production processes. The study's goal was to ascertain how production cost efficiency is impacted by just-in-time delivery, product quality, and management information systems. A survey of Karya Logam firm employees in Sidoarjo was done for this study. 92 respondents were used in a saturation sampling process. Next, SEM was used to analyze the data. The results demonstrate that while product quality does not substantially impact cost efficiency, just-in-time and management information systems do. The study also demonstrates how management information systems and cost efficiency are positively mediated by just-in-time delivery and product quality. Optimizing the utilization of management information systems is necessary since they are a critical component in raising cost efficiency. There are still few studies on JIT and product quality as mediating factors, especially in the context of cost effectiveness. By developing a model that included JIT and product quality as mediating factors, the study aimed to close this gap.

KEYWORDS: - Cost efficiency, just in time, Management information systems, Product quality.

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Published Online: February
2025

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1. INTRODUCTION

Controlling the production process is one technique to bring down costs. To achieve efficiency in production that aligns with the company's vision and goal, businesses must have a system that

adapts to market demand. Just-In-Time (JIT) inventory management is a productive and successful strategy (Nabila, 2021). The JIT approach places a strong emphasis on high quality, low cost, flexibility, and quick response times in order to minimize cost waste across the board for the business. By doing this, waste is reduced and the business's cost effectiveness is raised. When the JIT approach is used, costs that can be genuinely decreased are used, allowing actual costs to be less than budgeted. This is known as cost efficiency. By achieving this cost efficiency, it is envisaged that the corporation may obtain optimal profitability. Reducing production costs shouldn't come at the expense of the calibre of the goods produced in an attempt to boost cost efficiency. Production expenses are frequently a significant expense in a company's production process.

Inventory management and production cost analysis are also critical components of production cost control. The selling price of items is influenced by production costs, so maximizing profit margins requires an effective strategy. For company management to make the right decisions, information systems must provide accurate data. Information systems offer a database that makes input, processing, verification, and reporting procedures easier, as well as an integrated view of the business that encompasses all departments and operations (Wibowo, 2019). Cost, responsiveness, and flexibility-related data can therefore have a positive impact on cost management. Meanwhile, growing total assets, putting efficiency into practice, and enhancing corporate governance all have a significant impact on profitability and firm value, according to Sinaga & Bandonno (2021). The industrial business Karya Logam Company in Sidoarjo specialises in the metal and mineral industries. It does iron forging, pressing, stamping, and bending in addition to fixing iron tubes so they can be utilized again. In its operations, the corporation relies largely on logistics management that includes the full flow of materials from upstream to downstream, including procuring raw materials and product distribution. In an interview with one of the employees, who is a quality control processing in the production sector, it was discovered that there were various challenges experienced by the company connected to the JIT system and information system. Technical limitations on production machinery are one of the issues that frequently arise and can occasionally cause disruptions in the production flow. The production process is hindered and the production objective is not met when a machine is damaged. This could result in losses for the business and has an effect on declining productivity. The employee does, however, report that these issues are manageable and not life-threatening. This demonstrates that the business is aware of its operational concerns and prepared to deal with them as they crop up to keep production running smoothly and productivity levels high. The company's information system still employs two methods, according to the same statement. They use a computer system to record monthly income and expenses, but they manually record daily transactions. It can take a while to record every day using manual methods. Companies demand information systems to deliver timely, valid, and reliable data in this digital age. Businesses employ information systems to increase cost effectiveness and maximize revenues. To increase the effectiveness of their operations, firms also use this information system to speed policy and decision-making. Production costs have a significant role in achieving the company's profit-making goals regarding the calibre of the information system.

Meirina and Dewi (2020), indicated that the JIT variable does not have a substantial effect on cost efficiency. They suggested that this might happen since the amount of money removed from the

business's production costs was negligible, and there are other variables besides production cost efficiency that influence the application of JIT. However, Rahayu (2017) found that JIT significantly affects efficiency and cost effectiveness. Desembrianita et al. (2023) came to the conclusion that information systems improve cost effectiveness. One suggestion that is thought to be crucial for promoting business development is the application of JIT methods and management information systems. Researchers believe that JIT tactics and management information systems can improve cost effectiveness in this situation, which will raise business earnings.

There are many researches on cost efficiency, but only a few have studied using product quality and JIT as mediating factors, especially in terms of cost efficiency. This study aimed to bridge this gap by developing a model that considers product quality and JIT as mediating variables.

A comparison of input and output values, or the quantity of input per unit compared to the output per unit, can be used to determine cost efficiency. Production costs are typically understood to be the total amount of expenses incurred by a corporation during the production of goods or services. The goal of cost efficiency is to maximize output at the lowest possible cost. Another way to define cost efficiency is the capacity to attain desired outcomes at the lowest feasible cost. According to Isik & Hassan (2002), increased profit efficiency is influenced by increased revenue efficiency.

One of the primary drivers of cost effectiveness in an organization is the implementation of management information systems. Management information systems (MIS) can boost organisational efficiency, as demonstrated by Fadilla (2021). MIS is made to convert data into digital information that connected parties inside an organization or corporation can use to support their decision-making process. According to Syafira et al. (2019), MIS helps achieve JIT by enabling traceability and identifying any time or production quantity shortages as soon as possible. By creating automatic calculation tables for input, process, and output i.e., the best and worst decisions made during the printing process MIS and JIT integration are accomplished. Information systems improve both financial and non-financial performance, according to Dunk (2005). Operating expenses can be reduced by implementing management information systems, as demonstrated by Prananda and Datu (2016). Arifin et al. (2024), on the other hand, claimed that MIS improves product quality. Additionally, Kontesa (2022) claimed that managerial performance is impacted by MIS. In the meantime, just-in-time techniques enabled information technology integration to successfully reduce lead time, according to Ward & Zhou (2006). Based on the above explanation, the following hypothesis is developed:

Hypothesis 1: The quality of products is significantly impacted by management information systems.

Hypothesis 2: The impact of management information systems on just-in-time

Hypothesis 3: The impact of management information systems on cost efficiency is substantial.

Superior product quality is one of the triggers for consumer purchases, which ultimately has an impact on increasing company profits. According to Moku and Tumbel's (2015) empirical research, cost efficiency is significantly impacted by product quality. Meanwhile, Edison (2017) explains that product quality increases sales. Tresnawati et al. (2017) proves that efficiency costs

and quality costs significantly affect company profitability. Meanwhile, Kotcharin et al. (2012) states that high product quality and low cost capabilities are important for improving market performance (profit). Meirina& Dewi (2020) show that JIT has a positive effect on cost efficiency. Based on the above explanation, the following hypothesis is developed:

Hypothesis 4: Just in time is significantly impacted by product quality

Hypothesis 5: Cost effectiveness is significantly impacted by product quality

Just in Time is a concept where raw materials used for production activities are brought in from suppliers precisely, at the time the materials are needed by the production department, so that it will save or even eliminate inventory costs and storage costs in the warehouse. The JIT method ensures that the company has no inventory or is zero. If the company does not have a product, then the company will not pay inventory costs. This method tries to provide product inventory when needed in the right amount so that there is no leftover. Imaduddin (2016) and Istiqomah et al. (2023), stated that the implementation of the JIT concept has an impact on operational efficiency and cost control. Maelani and Husni (2022), proved that JIT has an impact on cost efficiency. Meanwhile, Haekal & Setiawan (2020), stated that the JIT method has the smallest total inventory cost, and is efficient compared to other methods. Based on the above explanation, the following hypothesis is developed:

Hypothesis 6: Cost efficiency is significantly impacted by just-in-time delivery.

A study framework that elucidates the relationship between research variables can be developed based on the obstacles and review of the literature shown in Figure 1.

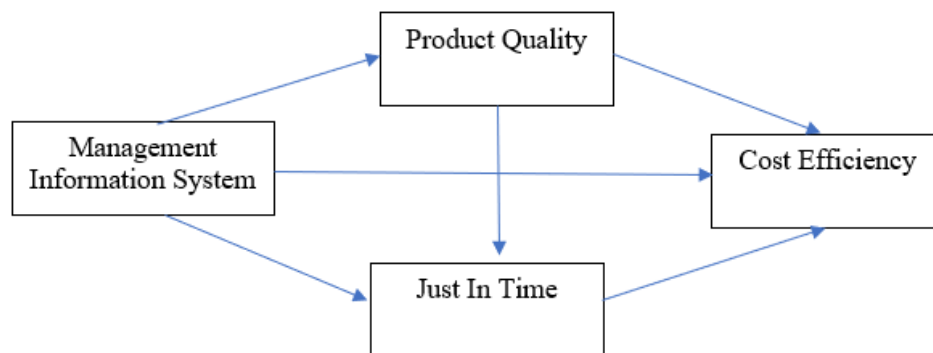


Figure 1: Framework for Research.

2. RESEARCH METHODOLOGY

This study is a causal study. The 92 workers of the Karya Logam Sidoarjo firm in East Java made up the study's population. Employing a non-probability sampling technique called saturation sampling. Utilizing Warp PLS software, SEM is the analysis method that is being applied. There is one independent variable used, namely the management information system. Two mediating variables are product quality and Just In Time. One dependent variable is Cost Efficiency. Meanwhile, the variables and variable indicators are shown in Table 1.

Table 1: Research variables and indicators

Variables	Indicator
Management information system Sholeh and Wahyudin (2021)	Accuracy (information must be correct), Timeliness (information must be timely), Appropriateness (information provided must be in accordance with what is requested), and Completeness (information provided must be complete)
Product quality Bayu et al. (2019)	Product performance: the ability of the product to benefit users Features: must include fundamental operations pertaining to development and options. Product reliability is determined by how unlikely it is that a product would experience harm. Conformance: appropriate product performance and high-quality shopping.
Just in time Rahayu (2017).	Production, Raw material delivery, and Just in time environment.
Production cost efficiency Munthoha et al. (2021).	Decision making for cost expenditure, Standard raw material cost, The costs of direct labour and Factory overhead.

Primary data from questionnaire responses, with two statements for each indicator, served as the study's data source. According to Kyriazos and Stalikas (2018), data was gathered by including multiple statements in the questionnaire, asking about demographics, and getting respondents' opinions on a 5-point Likert scale that ranges from 1 (strongly disagree) to 5 (strongly agree). Descriptive statistical analysis and hypothesis testing were then done. The outer model and inner model tests of the measurement model were carried out after the instrument test. The overall goodness of fit test was run in order to view the structural model and measurement model jointly. Finally, a test of the theory was conducted.

3. RESULT

Validity and reliability are examined in the process of instrument testing. Product moment correlation is used to assess the validity of the instrument; the findings demonstrate a correlation with a p value <0.05, indicating the validity of the questionnaire. Test for instrument reliability; all significant variables had Cronbach's Alpha (α) values greater than 0.6. The test's findings indicate that the questionnaire instrument can be utilized to collect reliable data under the same circumstances at different times and locations (Hair et al., 2014).

Profile Respondent

Respondents in this study were 92 employees. Respondent characteristics are divided based on gender, age, status and length of service shown in Table 2.

Table 2: Profile Respondent (N = 92)

Characteristics	Category	Frequency	Percentage (%)
Gender	Male	71	77.2
	Female	21	22.8
Age	17-24years	33	35.8
	25-35 years	42	45.6
	Greater than 35 years	17	18.6
Last education	High School Level	37	40.2
	Diploma Level	41	44.5
	Bachelor's Level	14	15.3
Status	Mate	53	57.6
	Single	39	42.4
Length of work	Less than 1 years	04	04.3
	1 – 2 years	37	40.2
	Greater than 2 years	51	55.5

Table 2 shows that most of the respondents are male, with married status, and still young because most of the respondents are aged 17-35 years. It can be seen from the information that as many as 40.2% of employees have a high school diploma, as many as 44.5% have a diploma, and 15.3% have a bachelor's degree. Table 2 also shows that respondents have worked in the company for more than 2 years. Thus, this condition shows that respondents are very familiar with the company's conditions.

Test for dependability and validity

The loading factor value of each indicator and the AVE (average variances extracted) value are both more than 0.5, according to the validity test results. Thus, all indicators and measures of convergent validity of the research variables match the standards. Discriminant validity is demonstrated by the AVE,s (square roots of average variance extracted) value, where the AVE,s value is in the diagonal position in the correlations among latent variables output WarpPLS, and the expected value is greater than the correlation value in the same block. Based on Table 3, the value in the diagonal block is bigger than the value in the same block. Thus, every variable satisfies the requirements for discriminant validity.

Table 3: Correlations among latent variables

Variable	SIM	P-Qualit	JIT	C-Effici
SIM	0.802	0.469	0.121	0.264
P-Qualit	0.469	0.795	0.119	0.275
JIT	0.121	0.119	0.663	0.191
C-Effici	0.121	0.119	0.663	0.791

The composite reliability and Cronbach's alpha were employed to assess the research variables' reliability test. Each variable's Cronbach Alpha value was better than 0.6, according to the test results. Furthermore, the composite reliability value was higher than 0.7. as demonstrated by Table 4. As a result, every variable created satisfies the requirements.

Table 4: Reliability Test Results

Cut Off Value		SIM	P-Qualit	JIT	C-Effici	Notes
Cronbach's Alpha	> 0.6	0.814	0.805	0.744	0.638	Every item satisfies the standards.
Composite Reliability	> 0.7	0.878	0.873	0.732	0.788	

Model's fit quality

The average path coefficient (APC), average R-squared (ARS), and average variance inflation factor (AVIF) are the three fit metrics in wrappls. The model fit indices test yielded APC and ARS values of $P < 0.001$ and $P < 0.05$, respectively. Less than 0.05 for both APC and ARS indicates that the model matches the data (in accordance or supported by the data). When the AVIF value is less than 5, it means that the data do not exhibit multicollinearity. The analysis's findings indicate that the AVIF value is 1.114, the ARS is 0.155, and the APC value is 0.226. where the multicollinearity of the independent variables and their correlations are indicated by AVIF and APC (Table 5). The assessment information indicates that the model is appropriate.

Table 5: Model's fit quality

Title	Result	Criteria	An explanation
Aver._ path_ coefficient	0.226	> 0.100	qualify
Aver._ R-squared	0.155	> 0.100	qualify
Aver._ adjusted_ R-squared	0.142	> 0.001	qualify
Aver._ block_ VIF	1.114	< 5.000	qualify

This study uses SEM analysis. This analysis is used to determine the effect of predictors on the predicted variables. The predictors in this study are Management Information System (MIS), Product quality (P_Qualit), Just In Time (JIT) while the predicted variable is Cost efficiency (C_Effici). The data is then coded and continued using WarpPLS. The estimated significant value of the study model parameters, as indicated in Table 6, is the basis for hypothesis testing.

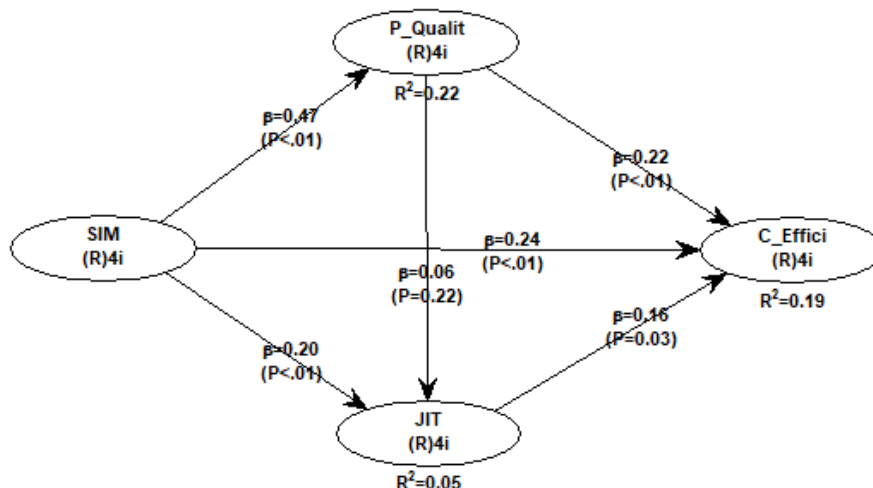


Figure 2: Coefficient of the study model trajectory
 (B= coeff.; p=prob.; R²=determination)

Table 6: Testing of Hypotheses

Direction of relationship	Coefficient	P-Value	Information
SIM→P-Qualit	0.471	0.000	Significant
SIM→JIT	0.198	0.008	Significant
SIM→C-Effici	0.240	0.002	Significant
P-Qualit→JIT	0.063	0.224	Not Significant
P-Qualit→ C-Effici	0.222	0.003	Significant
JIT→ C-Effici	0.159	0.026	Significant

Note: →= Influence

: SIM= Management information system, P-Qualit= Product quality, JIT= Just in time, C-Effici= Production cost efficiency.

Hypothesis Testing

To ascertain the relevance of the predictor variables' influence on the predicted variables, hypothesis testing is employed. Table 6 indicates that the correlation coefficient between management information systems and product quality is 0.471, accompanied by a p-value of 0.000 ($p < 0.05$). This suggests that MIS significantly and favorably affects the quality of the products. MIS and JIT have a coefficient value of 0.198 and a p-value of 0.008. This suggests that JIT is positively and significantly impacted by MIS. MIS and cost efficiency had a coefficient value of 0.240 and a p-value of 0.002, respectively. This suggests that MIS significantly and favorably affects cost effectiveness. Product quality and JIT had a coefficient value of 0.063 and a p-value of 0.224 ($p > 0.05$), respectively. This suggests that JIT is positively and marginally impacted by product quality. Product quality and cost efficiency have a coefficient value of 0.222 and a p-value of 0.003 ($p < 0.05$). This demonstrates how a product's quality positively and significantly affects cost effectiveness. A p-value of 0.026 ($p < 0.05$) indicates that the coefficient value between JIT and cost efficiency is 0.159. This demonstrates how cost efficiency is positively and significantly impacted by JIT.

4. DISCUSSION

The influence of management information systems on product quality

The findings of this study inform that the management information system has a significant effect on product quality. Thus, MIS providers in for cement for product quality. This evidence shows that the company's MIS according to respondents is good. This is reflected in the respondents' answers who stated that the MIS in the company is very helpful because during the production process carried out by employees as operators, they get very accurate information about the production results, thus control over the quality of the production results is clearly obtained through this information system. Thus, the quality of the production results is guaranteed and according to expectations. This study is in accordance with the findings of Arifin et al. (2024) which shows that MIS has a positive effect on product quality. The accuracy indicator contributes dominantly to forming the management information system, while completeness contributes the smallest to forming the management information system variable. Therefore, the problem of completeness still needs to be evaluated, because one of the main components of the management information system is Completeness (the information provided must be complete), this can be done by providing information as complete and accurate as possible, thus the production results will be good and without records.

The influence of management information systems on just in time

The results of the study showed a positive and significant influence of the management information system on JIT. This evidence shows that the management information system in the company is running well, as expected, and can help smooth the production process. By removing all waste from the production process, the company may achieve optimal delivery times, lower prices, and high-quality products while meeting customer deadlines. This is why the implementation of Just-In-Time (JIT) manufacturing is working effectively. The explanation related to the relationship between the management information system and JIT was stated by respondents that the JIT process can help speed up and simplify the production process, thus time efficiency can be obtained. These results are in accordance with the findings of Prananda and Datu's research (2016), which proves that the implementation of a management information system can save operating costs. Syafira et al. (2019), stated that the management information system supports the realization of JIT.

The influence of management information systems on cost efficiency

The third hypothesis validates that there is a noteworthy and positive impact of MIS on the efficiency of production costs. This demonstrates that MIS is one of the factors that leads to production cost efficiency. Enhancing MIS will hence guarantee higher manufacturing cost effectiveness. According to Mawardi and Ikasari's (2023) further explanation, managers may identify areas for improvement and see an overall picture of the company's performance with integrated data. The responses of those who said that the adoption of a management information system in businesses results in improved business process automation, centralized data management, accurate reporting and analysis, and lower operating costs also reflect this. These findings support those of Prananda and Datu (2016), who found that implementing a management information system can result in operating cost savings. In this study, a significant indirect effect was also found between MIS and cost efficiency through product quality (0.104), and through JIT

(0.031). This informs that the information system is a good intervening variable in the relationship between MIS and cost efficiency.

The influence of product quality on Just in time

The results of the investigation imply that the fourth hypothesis is rejected. This demonstrates that JIT is not strengthened by product quality. This data demonstrates that respondents' perceptions of the company's products' quality are a direct result of the JIT technique being implemented in the production process. This is supported by the responses of the respondents, who said that the company's JIT implementation has resulted in very good and fulfils expectations product quality. When the quality of the products produced is in compliance with specifications and Standard Operational Procedures, total quality control has an impact on enhancing product quality and cost efficiency, according to Hasanah and Pandin's (2021) further explanation.

Performance conformity indicators and product quality contribute dominantly to forming product quality, while product performance that provides benefits to consumers contributes the least to forming product quality variables. Therefore, the problem of product performance still needs to be evaluated, because one of the main components of product quality is that the product should provide benefits to consumers, this can be done by producing according to consumer needs and desires. Thus, the product can be used and is beneficial to consumers. This result is different from the findings of Hasanah and Pandin (2021), which states that JIT has a significant effect on improving product quality and cost efficiency.

The effect of product quality on cost efficiency

The study's findings support the acceptance of the fifth hypothesis. This attests to the fact that manufacturing cost efficiency is strengthened by product quality. This data demonstrates that the organization produces high-quality, accurately expected products that are processed effectively. This data demonstrates that respondents think the organization produces high-quality products that are inexpensively processed. Product quality, as also stated by Kotler and Keller (2016), is a product's overall capacity to carry out its intended functions, which includes accuracy, dependability, and durability. The study's findings support those of Tresnawati et al. (2017), who found that efficiency and quality costs had a big impact on a company's profitability. Lastiawan and Aprilyanti (2021), show that the performance measurement system and quality costs affect cost efficiency.

The impact of Just in time on cost efficiency

The impact of Just-in-time on production cost efficiency is validated by the sixth hypothesis. This indicates that the company's JIT program will be beneficial in helping to reduce manufacturing costs while also increasing production efficiency. This is consistent with Maelani and Husni's (2022) claim that JIT affects cost effectiveness. The JIT program that the company launched was intended to achieve the most efficient delivery time possible by getting rid of all waste in the production process and making it ideal. This is also reflected in the responses provided by the respondents. Therefore, it can be claimed that the Just-in-time system's application has contributed to the development of production cost efficiency. This study's findings support those of Meirina and Dewi (2020), demonstrating that Just-in-time (JIT) improves cost effectiveness. According to

Imaduddin (2016) and Istiqomah et al. (2023) research findings, the implementation of the Just-in-time (JIT) concept has an impact on cost control and operational efficiency.

Of the three variables hypothesized to affect cost efficiency, the dominant influence is the management information system. Thus it can be stated that the production process is very sensitive to the management information system.

5. CONCLUSIONS

This research creates a model that links the company's production cost efficiency to management information systems, product quality, and just-in-time delivery. It is stated that the model is very important for the research of production cost efficiency. This discovery will support the development of a conceptual model for the global industry that integrates management information systems, just-in-time delivery, product quality, and cost effectiveness.

JIT, MIS, and product quality all significantly improve cost effectiveness. While JIT is positively but marginally impacted by product quality. The relationship between MIS and cost efficiency is favorably and considerably mediated by product quality and JIT. The impact of MIS on cost efficiency is significant.

6. RECOMMENDATION

Due to the fact that this study's scope was limited to the Karya Logam company in Sidoarjo, it is advised that future researchers broaden their focus to include industrial companies and other cities within the province of East Java, as well as take into account other factors that were not included in the study but which undoubtedly affect how effectively a company's production costs are managed.

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