Indonesian Interdisciplinary Journal of Sharia Economics (IIJSE)
e-ISSN: 2621-606X
Vol. 9. No. 2 (2026)
Page: 17491-17501

Integrated Information System to Improve Production Efficiency and Inventory Accuracy in the F&B Industry

Dessyty[1]
Universitas Tarumanagara, Jakarta Barat, Indonesia
dessyty.126252052@stu.untar.ac.id

Verawati[2]
Universitas Tarumanagara, Jakarta Barat, Indonesia
verawati@fe.untar.ac.id

Abstract

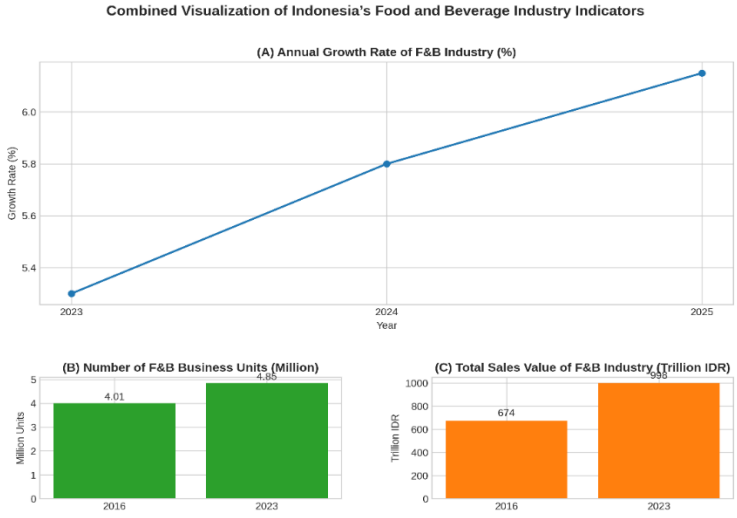
The Food and Beverage (F&B) industry operates in a highly dynamic environment characterized by rapid production cycles, fluctuating customer demand, limited processing time, and perishable raw materials. These conditions require companies not only to maintain efficient production activities but also to ensure accurate inventory management in order to minimize waste and operational disruptions. In many cases, delays in information flow and inaccurate stock records can negatively affect production continuity and overall business performance. Therefore, an integrated information system is essential to support effective coordination between operational divisions. This study aims to develop an integrated information system that connects production activities with inventory management processes. The system functions not only as a data recording platform but also as an operational integration tool that enables continuous and real-time information exchange across departments. By implementing a structured material requirement mechanism, the system is able to calculate raw material needs efficiently and automatically update inventory data whenever production activities occur. This integration ensures that information is distributed consistently throughout the operational process. The system was developed using an object-oriented approach to provide flexibility, scalability, and ease of future development. The implementation results indicate significant improvements in inventory data accuracy, reduced recording errors, and faster operational response times. Overall, the integrated information system contributes to enhancing production efficiency, maintaining inventory accuracy, and supporting operational stability within the F&B industry.

Keywords: Integrated Information System; F&B Industry; Inventory Management; Production Efficiency; Bill of Materials

INTRODUCTION

In recent years, the Food and Beverage (F&B) industry has experienced significant and rapid growth (see Figure 1). The F&B sector is characterized by highly dynamic and fast-paced operational activities, requiring companies to continuously adapt to changing market conditions and customer demands. This rapid development has increased the need for operational efficiency and effective resource management, particularly in production processes and inventory control systems. Efficient coordination between these activities is essential to maintain product quality, reduce waste, and ensure smooth business operations.

Figure 1.
Growth of the Food and Beverage Industry in Indonesia



Source: *Statistics Indonesia (BPS), Food and Beverage Service Business Report, 2023, and PT Citra Cendekia Indonesia Report, 2023.*

However, many companies still have not fully implemented integrated information systems in their operational activities. The use of manual recording methods or disconnected systems often creates discrepancies between recorded data and actual field conditions. These inconsistencies not only affect inventory accuracy but also disrupt the continuity of production processes. The problem becomes more critical when dealing with raw materials that have limited shelf lives. Inaccurate planning and delays in information flow may lead to unnecessary waste and increased operational costs that could otherwise be minimized.

In addition, limited coordination among departments further complicates operational performance. Each division often relies on its own data sources, resulting in ineffective communication, fragmented information flow, and less optimal decision-making processes. This condition highlights the growing importance of an integrated system capable of connecting multiple operational activities within the organization. An integrated information system does not merely function as a data recording tool, but also ensures that information can be shared, updated, and utilized continuously across all related departments.

Previous studies have shown that information system integration can improve operational efficiency and data accuracy (Lestari, 2022; Wijaya, 2023). Nevertheless, most

existing studies have not comprehensively integrated production planning, raw material usage, and inventory monitoring into a single structured system. Therefore, this study develops an integrated information system based on the Object-Oriented Analysis and Design (OOAD) approach to address these operational challenges. Through the implementation of an integrated information system, information flow is expected to become more effective, thereby supporting improved organizational performance and operational sustainability.

REVIEW OF LITERATURE

Integrated Information System

An integrated information system is an approach that connects various organizational functions to ensure that data flows consistently and continuously across departments. When all divisions operate using the same data, which is automatically updated in real time, work processes become faster, and the risk of recording errors can be significantly reduced. Stair and Reynolds (2018) explain that system integration helps organizations minimize data duplication, accelerate decision-making processes, and improve overall operational efficiency. In practice, integrated systems allow production, warehouse, and management departments to access the same information without the need for repetitive data entry. This capability is particularly important in industries that require rapid responses to changes in demand and operational conditions, such as the Food and Beverage (F&B) industry.

F&B Production Management

The F&B industry has operational characteristics that differ from those of other manufacturing industries. Most raw materials used in this sector are perishable, have limited shelf lives, and often require special handling procedures. Therefore, production planning must be carried out carefully to avoid overproduction or shortages of raw materials. Heizer and Render (2017) emphasize that demand fluctuations in the F&B industry require companies to adjust production capacity quickly and efficiently. Inaccurate planning may increase the risk of material waste, while insufficient production readiness can result in delays in fulfilling customer orders. Consequently, a system capable of supporting more precise production planning has become an essential requirement for F&B companies.

Inventory Control

Inventory control is an inseparable component of the production process. Without accurate inventory data, companies may face difficulties in determining when to purchase raw materials or when production schedules need adjustment. Schroeder (2020) states that inventory accuracy directly influences production continuity and cost efficiency. When inventory data do not reflect actual conditions, companies may experience two major problems: excess inventory, which leads to waste, or insufficient inventory, which disrupts production activities. In the F&B industry, both conditions can be highly detrimental because raw materials generally have relatively short shelf lives. Therefore, a system capable of

monitoring inventory in real time plays an important role in maintaining operational stability and reducing unnecessary losses.

Bill of Materials (BOM)

A Bill of Materials (BOM) is a structured list containing all raw materials required to produce a particular product. In the F&B industry, BOMs are typically developed based on product recipes or production formulas. Monczka et al. (2016) explain that BOM serves as the primary reference for determining the quantity of materials needed before production begins. With a well-defined BOM, the production department can calculate material requirements more accurately, while the warehouse department can ensure material availability according to operational needs. In addition, BOM assists companies in estimating production costs and minimizing the risk of material shortages during the production process.

Previous Studies

Several previous studies have demonstrated that system integration and production process digitalization provide significant benefits for operational efficiency. Putra (2021) found that the implementation of computerized production systems increased operational efficiency by up to 20%, mainly because recording processes became faster and more accurate. Lestari (2022) examined the integration between warehouse and production departments and reported that stock discrepancies were reduced by up to 30% after the implementation of an integrated system. Similarly, Li et al. (2020) showed that system integration improved inventory accuracy to approximately 95%, making stock data considerably more reliable. Meanwhile, Kumar and Singh (2021) highlighted the advantages of real-time inventory systems in reducing raw material waste, particularly in industries that rely heavily on perishable materials.

These findings indicate that system integration, effective production planning, and accurate inventory control are critical factors in improving operational efficiency. Therefore, this study adopts the theoretical foundations and findings from previous research as the basis for developing a more integrated information system tailored to the operational needs of the F&B industry.

RESEARCH METHOD

Research Approach

This study was conducted at PT Mie Star Global, a company operating in the Food and Beverage (F&B) industry, characterized by fast-paced production processes and the use of perishable raw materials. The company was selected because it provides a relevant environment for directly observing operational challenges related to inventory accuracy, production planning, and interdepartmental coordination within the F&B sector.

The study adopted the Object-Oriented Analysis and Design (OOAD) approach as the foundation for system development. This approach was chosen because it produces a more organized, modular, and scalable system structure that can be easily expanded in the future.

OOAD enables researchers to divide the system into objects with specific attributes and behaviors, making the analysis and design processes clearer and more structured. Furthermore, this approach ensures that each system component can operate independently while remaining interconnected with other components. As a result, future modifications or feature additions can be implemented without redesigning the entire system. The OOAD approach is particularly suitable for the F&B industry, where operational flexibility and adaptability are highly important.

Data Collection Techniques

To obtain an accurate understanding of system requirements, this study employed several data collection techniques. First, direct observations were conducted on production activities and warehouse workflows. These observations provided practical insights into how raw materials are received, stored, utilized, and recorded in daily operations. Second, interviews were carried out with warehouse staff, production staff, and other related personnel. The interviews aimed to identify operational problems, expected system features, and the existing recording procedures used within the company.

Third, document analysis was conducted using several operational documents, including Bill of Materials (BOM), inventory cards, raw material usage reports, and production reports. These documents helped identify material consumption patterns, usage frequency, and the data structures required by the system. The combination of these techniques provided a comprehensive understanding of operational conditions and system requirements.

Unified Modeling Language (UML) Modeling

After data collection, the next stage involved system modeling using Unified Modeling Language (UML). UML was selected because it offers various diagram types that can represent the system from multiple perspectives. Several UML diagrams were utilized in this study, including:

- **Use Case Diagram**, to illustrate the relationship between users and the main functions available in the system. This diagram helps identify actors and functional requirements.
- **Activity Diagram**, to describe the workflow of operational activities, starting from production planning to raw material usage recording.
- **Class Diagram**, to represent the data structure and relationships among system objects. This diagram serves as the foundation for database and system logic design.
- **Sequence Diagram**, to illustrate the sequence of interactions among objects during process execution. This diagram ensures that communication flows among system components operate according to requirements.
- The use of multiple UML diagrams ensured that the system was comprehensively designed from both process and data structure perspectives.

System Scope

The scope of the system developed in this study was limited to four primary functions considered essential for supporting production operations in the F&B industry. First, the system provides a production planning feature that determines raw material requirements based on the Bill of Materials (BOM) and planned production quantities. Second, the system supports raw material usage recording, ensuring that every material withdrawal from the warehouse is accurately documented. Third, the system offers real-time inventory monitoring, allowing users to view current stock levels without manual checking. This feature is important for preventing material shortages and minimizing waste. Fourth, the system is capable of generating operational reports, including material usage reports, inventory variance reports, and daily production reports. These reports support management in evaluation and decision-making processes. With this scope, the proposed system is expected to support production activities in a more structured manner, reduce recording errors, and improve overall operational efficiency.

RESULTS AND DISCUSSION

Problem Analysis

Based on field observations and interviews with warehouse and production staff at PT Mie Star Global, several operational problems were identified that directly affected the company's operational performance. The first issue was related to discrepancies between inventory records and the actual physical stock in the warehouse. These differences occurred because inventory recording was still handled separately by different departments, causing delays in data updates. In several cases, staff had to conduct repeated manual checks to verify stock availability, which slowed down daily operational activities.

The second issue involved raw material waste, particularly for materials with short shelf lives. Inaccurate calculations of material requirements resulted in some materials not being used according to the production plan. Consequently, certain materials exceeded their expiration period and had to be discarded. This condition not only increased operational costs but also indicated that production planning was not fully integrated with warehouse operations.

The third problem concerned production delays. These delays usually occurred when required raw materials were unavailable at the beginning of the production process. Production staff often had to wait for stock confirmation or postpone production until materials became available. This situation demonstrated that information flow between the warehouse and production departments had not yet operated in real time, preventing quick operational decision-making.

The final issue was related to the time-consuming process of preparing operational reports. Since most data were still recorded manually, staff required additional time to summarize material usage, calculate inventory discrepancies, and prepare daily reports. Delays in reporting prevented management from obtaining up-to-date operational information, reducing responsiveness to changing production needs. These problems indicate the necessity of a system capable of automatically updating data, reducing dependence on manual recording, and accelerating information flow across departments.

System Design

To address the operational problems identified at PT Mie Star Global, the proposed system was designed with several integrated features that complement one another. Each feature was developed to overcome specific obstacles related to production and inventory management.

The first feature is the Bill of Materials (BOM) recording module. Through this feature, each product has a clearly structured list of required raw materials. The BOM helps the company avoid manual calculations that often create discrepancies, as the system consistently displays material compositions for every production batch. As a result, production staff no longer need to search through separate documents or previous records.

The second feature is the automatic raw material requirement calculation. The system automatically adjusts material requirements based on the production plan entered by the user. These calculations are performed directly using the BOM reference, allowing the production department to determine whether available stock is sufficient before production begins. This feature reduces the risk of material shortages during production and supports more accurate purchasing planning.

The third feature is real-time inventory updating. Whenever raw materials are used or added to the warehouse, the system immediately updates stock quantities without requiring manual input. This mechanism is essential for minimizing discrepancies between physical inventory and system records, particularly in companies with intensive production activities. With automatic updates, warehouse staff no longer need to repeatedly verify stock availability manually.

The fourth feature is the minimum stock notification system. The system provides alerts when stock quantities approach predetermined minimum levels. These notifications help the warehouse department reorder materials in advance, preventing production interruptions caused by delayed procurement. This feature also helps avoid overstock conditions that may lead to waste, especially for perishable materials.

The fifth feature is the automatic generation of material usage and operational reports. The system can produce reports automatically based on daily operational data. These reports include information on material consumption, inventory movement, and production activities. With faster and more accurate reporting, management can make operational decisions without waiting for manual report recapitulation from staff.

In addition to these features, the system is equipped with user access control management. Each user is granted access rights according to their responsibilities. For example, warehouse staff are only authorized to manage inventory data, while management personnel can access comprehensive operational reports. This access structure improves data security and minimizes the risk of unauthorized or accidental data modifications.

Impact of System Implementation

The implementation of the system produced several significant improvements in PT Mie Star Global's operational activities. The first improvement was observed in inventory data accuracy. Before implementation, stock recording was conducted manually and frequently caused discrepancies between recorded and actual stock conditions. After implementation, inventory updates were performed automatically whenever materials were used or added. This improvement resulted in more consistent inventory data and reduced the need for repeated manual verification.

The second impact was the reduction of raw material waste, particularly for materials with short shelf lives. With more precise material requirement calculations, the company could determine the appropriate quantity of materials needed for each production batch. More accurate inventory monitoring also prevented materials from remaining unused in the warehouse for extended periods. Overall, the company was able to reduce the amount of waste caused by expired materials.

The third impact was the improvement in production workflow efficiency. Before the system was implemented, production staff often had to wait for stock confirmations or manually check material availability before starting production. After implementation, inventory information became immediately accessible, enabling faster production preparation. This improvement reduced waiting time and minimized the risk of production delays.

The fourth impact was the increased speed and accuracy of operational reporting. The system automatically summarized material usage data, inventory movement, and production activities. As a result, reports could be generated at any time without lengthy manual recapitulation processes. Management was able to obtain up-to-date information to support decision-making, particularly when responding to changes in production requirements. Table 1 summarizes the operational changes observed before and after system implementation. The data demonstrate how system integration contributed to improved accuracy, efficiency, and operational responsiveness.

Table 1.
Impact of System Implementation on Company Operations

Indicator	Before Implementation	After Implementation	Improvement
Inventory Accuracy	70–80%	95–99%	Significant increase
Raw Material Waste	High	Reduced by 15–40%	Improved efficiency
Reporting Speed	Slow	Real-time	Improved responsiveness
Production Delays	Frequent	Rare	Improved operational flow

Source: *Processed operational data from PT Mie Star Global (2025)*

Discussion

The results of the system implementation at PT Mie Star Global indicate that information integration across departments has a significant positive impact on the company's operational performance. One of the most noticeable improvements is the increased consistency of inventory data. Before the implementation of the system, warehouse and production staff often worked with different sets of data, causing repeated verification processes and operational inefficiencies. After the system was implemented, every inventory change was automatically recorded and could be accessed by all related departments in real

time. This condition simplified coordination processes and reduced the risk of errors that frequently occurred due to manual recording practices.

In addition, the system helped the company manage raw materials more efficiently. The automatic calculation of material requirements based on production plans enabled the company to prepare raw materials in more accurate quantities. This capability is particularly important in the F&B industry, where most raw materials are perishable and have limited shelf lives. With more accurate and timely information, the company was able to reduce the risk of material waste caused by expired stock. This improvement not only reduced operational costs but also supported the company in maintaining product quality and production consistency.

From the production perspective, the system contributed to a more organized and stable workflow. Prior to implementation, production staff often had to wait for stock confirmations or conduct manual inventory checks before starting production activities. After the system became operational, inventory information could be accessed directly, allowing production preparation to be completed more quickly and efficiently. This improvement reduced waiting times and minimized production delays that previously disrupted operational continuity.

The system also provided additional value in terms of operational reporting. Through automatic data recording, reports related to material usage, inventory movement, and production activities could be generated instantly without time-consuming manual recapitulation. Management gained faster access to updated operational information, enabling quicker and more accurate decision-making. This capability became particularly beneficial when the company needed to adjust production capacity or respond to changes in market demand. Faster access to information became one of the key factors supporting overall operational efficiency.

Overall, the findings of this study demonstrate that integrated information systems not only improve recording and monitoring processes but also strengthen coordination among departments within the company. With smoother information flow, the company can reduce operational errors, optimize raw material utilization, and accelerate decision-making processes. These findings are consistent with previous studies emphasizing the importance of system integration in improving operational performance within the F&B industry. Therefore, the implementation of an integrated information system can serve as an effective strategy for companies facing dynamic operational conditions and continuously changing production demands.

CONCLUSION

The results of this study demonstrate that the implementation of an integrated information system provides significant contributions to improving the company's operational performance. System integration enables production processes to operate more efficiently because each department can exchange information seamlessly and in real time, resulting in better coordination throughout the workflow. In addition to accelerating production activities, the system also plays an important role in reducing raw material waste through more accurate monitoring of material usage. Automated inventory recording further improves stock data accuracy and minimizes manual recording errors that previously caused inventory discrepancies.

With the availability of real-time data, management can respond more quickly to changes in production requirements and make strategic decisions based on more reliable and accurate information. The findings of this study imply that companies in the Food and Beverage (F&B) industry have substantial opportunities to reduce operational costs through the efficiency generated by integrated information systems. Furthermore, the implementation of such systems can strengthen operational control, improve resource utilization, and support more sustainable production management.

For future development, the system can be expanded by incorporating additional modules such as demand forecasting and direct integration with Point of Sale (POS) systems. These enhancements would broaden the system's functionality and improve the company's analytical capabilities, enabling management to predict production needs more accurately, respond to market changes more effectively, and support long-term operational decision-making.

REFERENCES

Booch, G., Rumbaugh, J., & Jacobson, I. (2005). *The unified modeling language user guide* (2nd ed.). Addison-Wesley.

Bowersox, D. J., Closs, D. J., & Cooper, M. B. (2019). *Supply chain logistics management* (6th ed.). McGraw-Hill.

Chopra, S., & Meindl, P. (2020). *Supply chain management: Strategy, planning, and operation* (7th ed.). Pearson.

Christopher, M. (2016). *Logistics and supply chain management* (5th ed.). Pearson.

Dennis, A., Wixom, B. H., & Roth, R. M. (2018). *Systems analysis and design* (7th ed.). Wiley.

Gunasekaran, A., Subramanian, N., & Ngai, E. W. T. (2019). Quality management in the digital era. *International Journal of Production Economics, 207*, 125–129.

Heizer, J., & Render, B. (2017). *Operations management* (11th ed.). Pearson.

Hopp, W. J., & Spearman, M. L. (2011). *Factory physics* (3rd ed.). Waveland Press.

Ivanov, D., Tsipoulanidis, A., & Schönberger, J. (2019). *Global supply chain and operations management* (3rd ed.). Springer.

Isbahi, M. B., Zuana, M. M. M. ., & Mariana, E. R. . (2022). The Technology Strategy in Website Communication Media in Improving Business Activities. *Majapahit Journal of Islamic Finance and Management*, *1*(2), 126–138. https://doi.org/10.31538/mjifm.v1i2.17

Jacobs, F. R., & Chase, R. B. (2018). *Operations and supply chain management* (15th ed.). McGraw-Hill.

Kumar, R., & Singh, P. (2021). Real-time inventory control for perishable goods: An empirical assessment in food manufacturing. *International Journal of Production Research, 59*(12), 3678–3691.

Laudon, K. C., & Laudon, J. P. (2019). *Management information systems: Managing the digital firm* (16th ed.). Pearson.

Lestari, D. (2022). Integrating warehouse and production workflows in food processing industries. *Jurnal Sistem Informasi Indonesia, 8*(2), 55–64.

Li, D., & Wang, X. (2017). *Operations management of logistics and supply chain: Issues and directions*. Springer.

Li, X., Zhang, Y., & Chen, L. (2020). Improving inventory accuracy through integrated information systems in food manufacturing. *Journal of Industrial Engineering, 45*(3), 221–234.

Monczka, R. M., Handfield, R. B., Giunipero, L. C., & Patterson, J. L. (2016). *Purchasing and supply chain management* (6th ed.). Cengage Learning.

Nahmias, S., & Olsen, T. L. (2015). *Production and operations analysis* (7th ed.). Waveland Press.

Putra, A. (2021). Digital production systems and their impact on operational efficiency. *Jurnal Teknologi dan Industri, 5*(1), 12–20.

Schroeder, R. G. (2020). *Operations management: Contemporary concepts and cases* (7th ed.). McGraw-Hill.

Silver, E. A., Pyke, D. F., & Thomas, D. J. (2017). *Inventory and production management in supply chains* (4th ed.). CRC Press.

Slack, N., Brandon-Jones, A., & Burgess, N. (2022). *Operations management* (10th ed.). Pearson.

Sommerville, I. (2016). *Software engineering* (10th ed.). Pearson.

Stair, R., & Reynolds, G. (2018). *Principles of information systems* (13th ed.). Cengage Learning.

Stevenson, W. J. (2021). *Operations management* (14th ed.). McGraw-Hill.

Trienekens, J., & Zuurbier, P. (2008). Quality and safety standards in the food industry. *International Journal of Production Economics, 113*(1), 107–122.

Turban, E., Pollard, C., & Wood, G. (2018). *Information technology for management* (11th ed.). Wiley.

Wijaya, R. (2023). Real-time inventory monitoring in the F&B sector: A case study. *Jurnal Informatika dan Bisnis, 4*(3), 101–110.