PAKUAN MANAGEMENT STUDIES REVIEW
Volume 1 Issue 1, 2026
Page No. 16 - 27

An EOQ-Based Decision Framework for Seasoning Raw Material Inventory in Instant Noodle Production

Khaerunisa[1]*
Doni Wihartika[1],
Tutus Rully[1]

[1]*Faculty of Economics and Business, Universitas Pakuan, Bogor, Indonesia.*
[*]***Corresponding author:*** *khaerunisai504@gmail.com*

Article History
Received: July 24, 2026
Revised: August 17, 2026
Accepted: August 17, 2026
Published: August 31, 2026

Keywords
Economic Order Quantity
Inventory Control
Production Continuity
Reorder Point
Safety Stock

Abstract
This study develops an Economic Order Quantity (EOQ)-based decision framework for managing seasoning raw materials at PT XYZ, an instant-noodle manufacturer in Ciawi, Bogor. A descriptive quantitative case-study design was employed using field observation, interviews with Production Planning and Inventory Control (PPIC) and warehouse personnel, and company records for September-November 2025. The analysis examined eight inventory clusters and calculated EOQ, safety stock, and reorder point (ROP) for eight priority materials: garlic, chili powder, palm oil, sweet soy sauce, salt, lemongrass, flavor, and carrot. Baseline evidence showed that opening stock for most priority materials was substantially below production requirement plus safety stock, indicating a recurring procurement gap associated with supplier minimum-order policies, price and quality variability, seasonal supply disruption, and the absence of a consistently applied quantitative replenishment rule. The resulting EOQ values ranged from 93 kg for lemongrass to 916 L for palm oil, while the corresponding ROP values ranged from 8 kg to 144 L. These values provide material-specific guidance for order quantity and timing and distinguish fresh, quality-sensitive ingredients from more storage-stable inputs. The proposed framework combines EOQ, safety stock, and ROP with closer coordination among PPIC, warehouse, procurement, and production, supported by improved SAP data integration. Because the recommendations were not implemented and re-measured during the internship period, the findings represent an operational decision baseline rather than verified cost savings or causal improvement in production attainment.

1. Introduction

The instant-noodle industry operates under high-volume demand, short production cycles, and strong requirements for consistent product quality. Global demand reached 121.5 billion servings in 2024, while Indonesia consumed 14.68 billion servings and remained the world's second-largest market(*World Instant Noodles Association*, 2024). This scale makes the continuity of raw-material supply a strategic operational issue because even a short shortage of seasoning components may interrupt production, alter the product mix, or delay order fulfillment.

Table 1 Global and Indonesian Instant-Noodle Consumption, 2020-2024

No	Year	Global (billion servings)	Indonesia (billion servings)
1	2020	116.56	12.64

No	Year	Global (billion servings)	Indonesia (billion servings)
2	2021	118.18	13.27
3	2022	121.2	14.26
4	2023	120.2	14.42
5	2024	121.5	14.68

Source: World Instant Noodles Association (2024).

Sustained demand requires manufacturers to balance material availability, ordering cost, storage capacity, freshness, and production schedules. Poorly specified order quantities and reorder timing can create both stockout and overstock, whereas a structured Economic Order Quantity approach provides a clearer basis for determining how much raw material to purchase (Adzaky et al., 2024) Applying reorder point and safety stock alongside this approach further helps a company decide when to reorder and how much buffer stock to hold so that production is not interrupted while waiting for incoming supply (Triagustin dan Himawan, 2022). Indonesian evidence on raw-material information systems likewise indicates that combining EOQ with reorder point keeps replenishment better aligned with actual production requirements (Susanti & Wahyuningsih, 2023). Similar evidence from a tempe-manufacturing case shows that applying EOQ together with a periodic-order-quantity rule helps a company avoid both shortage and excess raw-material stock (Handayani dan Afrianandra, 2022).

PT XYZ produces Mi Gaga instant noodles at its Ciawi plant. Its seasoning system combines fresh and dry ingredients, oils, sauces, spices, and production additives with different shelf lives, lead times, prices, and quality risks. This heterogeneity means that a single, undifferentiated replenishment rule is unlikely to fit every raw material in the portfolio. Comparable evidence from a food-seasoning manufacturer shows that an effective inventory-management system supports more efficient supply and distribution of this kind of raw material (Vega & Nayat, 2022).

Field observation indicated that seasoning stock was not consistently aligned with the September 2025 production requirement. Short inventory exposes the company to production delay and schedule changes, whereas excess inventory increases holding cost and deterioration risk. Table 2 summarizes the raw-material requirement, buffer stock, opening stock, and resulting net procurement requirement. Net procurement requirement is calculated as production requirement plus safety stock minus opening stock.

Table 2 Seasoning Raw-Material Requirement and Stock Position, September 2025

No	Cluster	Raw material	Requirement	Safety stock	Opening stock	Net procurement requirement
1	Onion	Shallot	250 kg	50 kg	--	300 kg
2	Onion	Garlic	300 kg	60 kg	--	360 kg
3	Onion	Bombay onion	200 kg	40 kg	--	240 kg
4	Onion	Spring onion	90 kg	18 kg	--	108 kg
5	Chili	Bird's eye chili	120 kg	25 kg	--	145 kg
6	Chili	Green chili	100 kg	20 kg	--	120 kg

No	Cluster	Raw material	Requirement	Safety stock	Opening stock	Net procurement requirement
7	Chili	Red chili	180 kg	35 kg	--	215 kg
8	Chili	Curly red chili	150 kg	30 kg	--	180 kg
9	Chili	Chili powder	200 kg	40 kg	20 kg	220 kg
10	Oil	Vegetable oil	500 L	100 L	40 L	660 L
11	Oil	Palm oil	900 L	180 L	80 L	1,000 L
12	Oil	Soybean oil	400 L	80 L	30 L	450 L
13	Oil	Sesame oil	120 L	25 L	10 L	135 L
14	Oil	Fish oil	100 L	20 L	8 L	112 L
15	Soy sauce & sauce	Fish sauce	150 L	30 L	15 L	165 L
16	Soy sauce & sauce	Salty soy sauce	200 L	40 L	20 L	220 L
17	Soy sauce & sauce	Sweet soy sauce	300 L	60 L	25 L	335 L
18	Soy sauce & sauce	Chili/tomato sauce	300 L	60 L	25 L	335 L
19	Soy sauce & sauce	Soy sauce extract	250 L	50 L	20 L	280 L
20	Base seasoning	Flavor enhancer (Ajinomoto)	350 kg	70 kg	50 kg	370 kg
21	Base seasoning	Salt	600 kg	120 kg	60 kg	660 kg
22	Base seasoning	Glutamate	250 kg	50 kg	30 kg	270 kg
23	Base seasoning	Granulated sugar	350 kg	70 kg	30 kg	390 kg
24	Base seasoning	Palm sugar	200 kg	40 kg	15 kg	225 kg
25	Base seasoning	MSG	400 kg	80 kg	50 kg	430 kg
26	Base seasoning	Monosodium glutamate	350 kg	70 kg	30 kg	390 kg
27	Spices	Whole fennel	25 kg	5 kg	3 kg	27 kg
28	Spices	Clove	10 kg	3 kg	2 kg	11 kg
29	Spices	Lime leaf	40 kg	8 kg	--	48 kg
30	Spices	Bay leaf	25 kg	5 kg	--	30 kg

No	Cluster	Raw material	Requirement	Safety stock	Opening stock	Net procurement requirement
31	Spices	Ginger	75 kg	15 kg	--	90 kg
32	Spices	Cumin	20 kg	5 kg	3 kg	27 kg
33	Spices	Cardamom	15 kg	3 kg	2 kg	16 kg
34	Spices	Cinnamon	30 kg	8 kg	4 kg	34 kg
35	Spices	Candlenut	50 kg	10 kg	5 kg	55 kg
36	Spices	Coriander	40 kg	8 kg	4 kg	44 kg
37	Spices	Turmeric	80 kg	16 kg	--	96 kg
38	Spices	Black pepper	25 kg	5 kg	3 kg	27 kg
39	Spices	White pepper	30 kg	6 kg	3 kg	33 kg
40	Spices	Galangal (laja)	40 kg	8 kg	4 kg	44 kg
41	Spices	Galangal (lengkuas)	50 kg	10 kg	--	60 kg
42	Spices	Candlenut (muncang)	15 kg	3 kg	2 kg	16 kg
43	Spices	Oregano	15 kg	3 kg	2 kg	16 kg
44	Spices	Nutmeg	10 kg	3 kg	1 kg	12 kg
45	Spices	Lemongrass	90 kg	18 kg	--	108 kg
46	Spices	Star anise	12 kg	3 kg	2 kg	13 kg
47	Production additives	Anti-caking agent	40 kg	10 kg	6 kg	44 kg
48	Production additives	Koya powder	150 kg	30 kg	15 kg	165 kg
49	Production additives	Flavor	500 L	100 L	40 L	560 L
50	Production additives	Beef fat	250 kg	50 kg	20 kg	280 kg
51	Production additives	Liquid coconut cream	200 L	40 L	15 L	225 L
52	Additional vegetables	Carrot	120 kg	25 kg	--	145 kg

Source: Processed from PT XYZ secondary data (2025).

The baseline data show substantial procurement gaps across the priority materials. Garlic had a net procurement requirement of 360 kg with no opening stock; chili powder required 220 kg against 20 kg on hand; palm oil required 1,000 L against 80 L on hand; and comparable gaps appeared for sweet soy sauce, salt, lemongrass, flavor, and carrot. Similar findings in other manufacturing settings show that applying a quantitative inventory-control method such as EOQ can help a company reduce the likelihood of both shortage and excess raw material (Ardani et al, 2024). Evidence from small and medium enterprises likewise indicates that a structured replenishment method keeps total inventory cost lower than purchasing based only on the owner's estimation (Basyid & Kaspul, 2020).

The stock imbalance coincided with differences between production targets and realization for several Mi Gaga variants from September to November 2025. This study does not treat inventory shortage as the sole cause of those differences because demand reprioritization, machine speed, cycle time, and downtime also affected output. Instead, the target-realization gap is used as contextual evidence that inventory planning, production scheduling, and shop-floor conditions were not yet fully synchronized.

The research gap concerns the application of a transparent EOQ-based decision framework to a heterogeneous seasoning portfolio that includes fresh, dry, liquid, and quality-sensitive inputs under supplier Minimum Order Quantity (MOQ) and Minimum Order Delivery (MOD) constraints. Previous EOQ studies commonly demonstrate potential cost or quantity advantages, but many do not explicitly distinguish between storage-stable and perishable materials or integrate replenishment decisions with PPIC and enterprise-system data. Recent Indonesian evidence indicates that adopting an integrated, technology-supported inventory system strengthens operational performance when it is paired with disciplined processes (Santoso et al., 2022). Real-time, system-based inventory information has likewise been shown to reduce stock-recording errors and improve the effectiveness of replenishment decisions (Larutama et al., 2023).

Accordingly, this study aims to: (1) diagnose the actual seasoning raw-material stock position relative to production requirements; (2) calculate EOQ, safety stock, and ROP for eight priority materials; (3) explain the operational constraints that limit alignment with the calculated values; and (4) formulate an implementable decision framework linking inventory control, production planning, cross-functional coordination, and SAP-based data integration. The contribution is a material-specific operational baseline rather than a claim of verified post-implementation effectiveness.

2. Literature Review

2.1. Inventory Management and Production Continuity

Inventory management determines how much material should be held, when replenishment should occur, and how ordering decisions balance service requirements against cost. In manufacturing, inventory decisions connect procurement, storage, production scheduling, and customer fulfillment (Jay et al., 2022). Empirical evidence from Indonesian manufacturing shows that structured, quantitative raw-material planning improves visibility over order quantity and frequency compared with relying on estimation alone (Adzaky et al., 2024). Comparable evidence from a spinning-department case likewise shows that a planned, systematic approach to raw-material management helps a company balance production needs against inventory cost (Triagustin dan Himawan, 2022).

Production continuity depends on having the right material, in the required quality and quantity, at the time it is needed. When purchasing is based primarily on judgment, fluctuating demand and supplier restrictions can create simultaneous stockout and overstock risks. Evidence from raw-material control practice shows that a controlled, quantity-based replenishment approach helps a company avoid both excess and shortage of stock and keeps production running smoothly (Pradana dan Jakaria, 2020).

For seasoning materials, continuity must be balanced with quality preservation. Fresh ingredients, such as garlic, lemongrass, and carrot, are more exposed to deterioration than palm oil, salt, or dry powder, and this heterogeneity is the reason a single replenishment rule is unlikely to fit every material in the portfolio.

Quality variability adds a further constraint because nonconforming inputs may require inspection, rejection, replacement, or reordering. In the case company, this variability was compounded by supplier Minimum Order Quantity and Minimum Order Delivery terms that limited how flexibly purchase quantities could be adjusted. Consequently, calculated EOQ values should be treated as decision parameters that remain subject to supplier quality, packaging, storage, and handling requirements.

Inventory also interacts with the broader production system. Integrated procurement-production models emphasize that isolated purchasing decisions may shift cost or risk to another function, whereas synchronized decisions improve material flow and operational performance (Marsetiya et al., 2022).

This perspective supports the joint consideration of PPIC, warehouse, procurement, and production data in the present study.

2.2. Inventory Costs

Inventory cost comprises ordering, holding, shortage, and purchase costs. Ordering cost includes administrative processing, transport coordination, receiving, and inspection. Holding cost includes storage, handling, insurance, deterioration, and the opportunity cost of capital. Shortage cost arises from emergency purchasing, idle production capacity, delayed orders, and possible loss of customer confidence. Purchase cost is affected by unit price, supplier terms, and quantity discounts. These components can be expressed as:

$$\mathbf{TC = OC + HC + SC + PC} \quad \text{.......................................} \ (1)$$

Where TC is total inventory cost, OC is ordering cost, HC is holding cost, SC is shortage cost, and PC is purchasing cost. In food manufacturing, inventory performance is associated with profitability, but the cost effect depends on the quality of replenishment and monitoring practices rather than inventory reduction alone (Gołaś, 2020).

2.3. Economic Order Quantity

Economic Order Quantity determines the order quantity that balances ordering and holding costs for a specified demand period. Its managerial value lies in converting demand and cost data into a repeatable purchasing rule. Recent application evidence shows that EOQ can help a company identify a more economical purchase quantity and reduce avoidable ordering and holding costs (Triagustin dan Himawan, 2022). Related evidence indicates that sound inventory-management practice of this kind is also associated with better company operational performance (Zahra et al, 2025).

$$\mathbf{EOQ = sqrt(2DS / H)} \quad \text{.......................................} \ (2)$$

Where D is demand for the selected planning period, S is ordering cost per order, and H is holding cost per unit for the same period. Period consistency is essential: demand and holding cost must refer to the same planning horizon.

$$\mathbf{TIC = (D/Q)S + (Q/2)H} \quad \text{.......................................} \ (3)$$

Where TIC is the relevant inventory cost under the basic EOQ assumptions and Q is the order quantity. The classical model assumes stable demand, known ordering and holding costs, fixed lead time, and no shortage during replenishment. Where those assumptions are weak, the calculated EOQ should be used as a baseline and complemented by sensitivity analysis, supplier constraints, and managerial judgment.

2.4. Safety Stock and Reorder Point

Safety stock protects production against uncertainty in usage, lead time, quality rejection, and delivery. Reorder Point indicates the stock level at which a new order should be initiated so that replenishment arrives before usable stock is exhausted. Applying safety stock and reorder point together has been shown to help a company keep its raw-material monitoring, requirement planning, and ordering system from disrupting production (Brahmantyo et al., 2023). More broadly, safety-stock allocation should reflect the location and role of inventory within the wider distribution system rather than a single fixed rule (Sbai & Berrado, 2023).

$$\mathbf{ROP = (d \times L) + SS} \quad \text{.......................................} \ (4)$$
$$\mathbf{SS = 20\% \times (d \times L)} \quad \text{.......................................} \ (5)$$

Where d is average daily usage, L is lead time in days, and SS is safety stock. Because historical demand variance and target service-level data were not available, this study operationalizes safety stock as 20% of lead-time demand. This is a case-specific planning assumption, not a universal safety-stock standard.

2.5. Perishable-Inventory Risk and Digital Integration

Perishable and quality-sensitive inventory requires a decision rule that limits both shortage and deterioration. Seasonal supply, uncertain lead times, and variable demand can change the appropriate replenishment quantity over time, and fuzzy-forecasting evidence shows that accounting for this uncertainty improves inventory-optimization outcomes (Namwad et al., 2024). Digital integration can strengthen this decision process by linking demand, inventory, purchasing, and production records. Real-time, system-based inventory information has been shown to reduce recording errors and support more effective operational decisions (Larutama et al., 2023). Indonesian evidence likewise associates ERP adoption with stronger operational performance when it is supported by integrated processes and capable personnel (Santoso et al., 2022).

2.6. Previous Studies and Research Gap

Recent EOQ applications have calculated economic order quantities, safety stock, and reorder points in manufacturing and small food enterprises (Adzaky et al., 2024). These studies support the use of quantitative replenishment rules but generally focus on one or a small number of comparatively homogeneous materials. Other evidence shows that inventory-management practice is linked more broadly to company performance, though usually without distinguishing storage-stable from perishable materials within a single portfolio (Fajlur & Nursyamsiah, 2023). The present study connects these two streams by applying a transparent EOQ-SS-ROP framework to a heterogeneous seasoning portfolio and explicitly integrating the calculations with PPIC coordination and SAP-based decision support.

3. Methods

3.1. Research Design and Setting

This study used a descriptive quantitative case-study design conducted during a four-month internship in the PPIC department of PT XYZ in Ciawi, Bogor, from 1 September to 30 December 2025. The design was selected to document the actual inventory condition, calculate material-specific replenishment parameters, and formulate operational recommendations without claiming an experimental treatment effect.

3.2. Unit of Analysis and Data Sources

The unit of analysis was seasoning raw material managed by PPIC. The inventory portfolio comprised eight clusters: onion, chili, oil, soy sauce and sauce, base seasoning, spices, production additives, and additional vegetables. Quantitative data included September 2025 production requirements, opening stock, safety-stock data, unit prices, ordering costs, holding-cost rates, and lead times, together with production target-and-realization records for September-November 2025. Qualitative operational evidence came from observation and discussions with PPIC, warehouse, procurement, and production personnel.

3.3. Data Collection

Data were collected through direct observation of procurement, storage, material issue, and production-planning activities; semi-structured discussions with the field supervisor and relevant personnel; and documentation of inventory records, Bill of Material data, purchasing parameters, and production reports. Triangulation across observation, interview explanations, and company records was used to check the consistency of the operational interpretation.

3.4. Analytical Procedure

The analysis followed four stages. First, net procurement requirement was calculated as production requirement plus the existing safety-stock allowance minus opening stock. Second, eight priority materials were selected to represent the inventory clusters: garlic, chili powder, palm oil, sweet soy sauce, salt, lemongrass, flavor, and carrot. Third, all EOQ parameters were harmonized to the monthly planning period. Holding cost per unit (H) was calculated as unit price multiplied by the holding-cost rate; daily usage (d) was calculated as monthly requirement divided by a 30-day planning month; EOQ was calculated as sqrt(2DS/H); safety stock was set at 20% of lead-time demand; and ROP was calculated as lead-time demand plus safety stock. EOQ values were rounded to practical whole units, while safety-stock and ROP quantities were rounded upward to avoid under-protection. Fourth, production target-realization patterns and field explanations were used to formulate coordination and system-integration recommendations.

3.5. Evaluation Criteria and Scope

The analysis was considered complete when it documented the baseline stock gap, produced transparent EOQ-SS-ROP calculations, identified the operational constraints affecting applicability, and formulated a feasible implementation framework. The study did not compare pre- and post-implementation inventory cost, service level, stockout frequency, waste, or production attainment. Accordingly, effectiveness is interpreted as decision usefulness and internal consistency of the framework, not as a verified causal outcome.

4. Results and Discussion

4.1. Baseline Inventory and Production Requirement

Table 2 indicates that the opening stock of most priority materials was inadequate relative to production requirement plus the existing buffer allowance. Garlic and lemongrass had no opening stock; carrot likewise had no opening stock; and palm oil, sweet soy sauce, salt, chili powder, and flavor had only a small proportion of the quantity required. These gaps show that purchasing timing and quantity were not yet consistently determined through a common quantitative rule.

The risk profile differed by material. Storage-stable materials such as palm oil, salt, and sweet soy sauce can generally tolerate larger lots, while fresh ingredients such as garlic, lemongrass, and carrot require closer control of freshness, inspection, and delivery frequency because of their comparatively short shelf life.

Interviews attributed the baseline imbalance to MOQ and MOD provisions, fluctuating prices, inconsistent quality, harvest disruption, and limited integration of purchasing parameters with production plans. The finding is also consistent with evidence that raw-material order quantity and frequency should be explicitly planned to avoid shortage and excess and to support smoother production (Nazwa et al., 2024).

4.2. Production Plan and Realization

Production records for September-November 2025 showed both under-realization and over-realization across Mi Gaga variants. Inventory availability was one contributing condition, but the field evidence also identified demand reprioritization, machine RPM and cycle-time assumptions, and downtime. The results therefore demonstrate an alignment problem among inventory, production planning, and shop-floor execution rather than a single-variable causal effect.

A decision framework should therefore use inventory parameters as one input to a wider PPIC process. Production targets should be updated using current material availability, confirmed supplier deliveries, machine capacity, and order priorities. This approach is consistent with integrated procurement-production models that emphasize coordinated rather than isolated optimization (Marsetiya et al., 2022).

4.3. EOQ, Safety Stock, and Reorder Point

Tables 3 and 4 present the input parameters and calculated decision values for the eight priority materials. The calculations use a common monthly period and the case-specific safety-stock rule described in the Methods section.

Table 3 Input Parameters for EOQ Calculation of Priority Raw Materials

No	Raw material	Monthly requirement (D)	Ordering cost (S)	Unit price (C)	Holding cost rate (i)	Lead time (L)
1	Garlic	300 kg	IDR 250,000	IDR 28,000/kg	8%	2 days
2	Chili powder	200 kg	IDR 200,000	IDR 35,000/kg	7%	3 days

No	Raw material	Monthly requirement (D)	Ordering cost (S)	Unit price (C)	Holding cost rate (i)	Lead time (L)
3	Palm oil	900 L	IDR 350,000	IDR 15,000/L	5%	4 days
4	Sweet soy sauce	300 L	IDR 250,000	IDR 18,000/L	7%	3 days
5	Salt	600 kg	IDR 300,000	IDR 12,000/kg	5%	3 days
6	Lemongrass	90 kg	IDR 100,000	IDR 14,000/kg	15%	2 days
7	Flavor	500 L	IDR 250,000	IDR 25,000/L	8%	3 days
8	Carrot	120 kg	IDR 100,000	IDR 10,000/kg	15%	2 days

Source: Processed from PT XYZ secondary data (2025).

Table 4 EOQ, Safety Stock, and Reorder Point for Priority Raw Materials

No	Raw material	Holding cost (H)	Daily usage (d)	EOQ	Safety stock (SS)	Reorder point (ROP)
1	Garlic	IDR 2,240/kg	10 kg/day	259 kg	4 kg	24 kg
2	Chili powder	IDR 2,450/kg	6.67 kg/day	181 kg	4 kg	24 kg
3	Palm oil	IDR 750/L	30 L/day	916 L	24 L	144 L
4	Sweet soy sauce	IDR 1,260/L	10 L/day	345 L	6 L	36 L
5	Salt	IDR 600/kg	20 kg/day	775 kg	12 kg	72 kg
6	Lemongrass	IDR 2,100/kg	3 kg/day	93 kg	2 kg	8 kg
7	Flavor	IDR 2,000/L	16.67 L/day	354 L	10 L	60 L
8	Carrot	IDR 1,500/kg	4 kg/day	126 kg	2 kg	10 kg

Source: Authors' calculations based on PT XYZ secondary data (2025).

The EOQ values ranged from 93 kg for lemongrass to 916 L for palm oil. Garlic generated an EOQ of 259 kg, chili powder 181 kg, sweet soy sauce 345 L, salt 775 kg, flavor 354 L, and carrot 126 kg. The results reflect the interaction of requirement, ordering cost, price, and holding-cost rate. The comparatively smaller quantities for fresh ingredients support more frequent replenishment and quality control, whereas the larger values for storage-stable inputs support less frequent ordering. Similar material-specific differences in EOQ outcomes are reported in other manufacturing applications of the method (Triagustin dan Himawan, 2022).

The ROP values indicate when replenishment should be initiated: 24 kg for garlic and chili powder, 144 L for palm oil, 36 L for sweet soy sauce, 72 kg for salt, 8 kg for lemongrass, 60 L for flavor, and 10 kg for carrot. These values should be embedded in SAP alerts or purchasing dashboards and reviewed when lead time, usage, supplier terms, or quality-rejection rates change. The EOQ, SS, and ROP values are therefore adjustable decision parameters rather than permanent constants.

4.4. Production Planning and Cross-Functional Control

The target-realization gap requires closer coordination among PPIC, warehouse, procurement, quality control, and production. A rolling production plan should reconcile confirmed demand, usable stock, open purchase orders, supplier delivery status, quality-inspection outcomes, machine capacity, and downtime. Fresh materials should be reviewed more frequently than dry or stable items, while exceptional demand or supply disruption should trigger recalculation rather than automatic use of historical parameters (Namwad et al., 2024).

Managerial control should include measurable indicators: stockout incidence, emergency purchase frequency, days of inventory, obsolete or rejected material, supplier on-time delivery, purchase-order lead-time variance, schedule attainment, and production loss caused by material unavailability. These indicators provide the post-implementation evidence needed to test whether the framework improves cost and production performance.

4.5. SAP-Based Inventory and Production Integration

SAP should function as the shared information platform connecting inventory balances, BOM requirements, purchase orders, supplier lead times, inspection status, production schedules, and realization. ERP research indicates that integrated systems improve manufacturing visibility and productivity when process discipline, data quality, and personnel capability are jointly developed (Santoso et al., 2022). Real-time, system-supported inventory information likewise strengthens coordination between warehouse and production decisions (Larutama et al., 2023).

4.6. Expected Operational Contribution and Implementation Limits

The proposed framework is expected to improve the consistency of order-quantity and reorder-timing decisions, reduce ad hoc purchasing, and provide earlier warning of material shortages. It may also reduce excess stock for fresh materials and improve the realism of production schedules. These outcomes remain propositions until the company applies the framework and evaluates pre-post indicators. Supplier MOQ/MOD rules, quantity discounts, packaging units, storage capacity, material substitution, and quality constraints may require negotiated or constrained EOQ values.

4.7. Comparison with Previous Research and Managerial Implications

The study supports prior evidence that EOQ, safety stock, and ROP can improve the structure of raw-material decisions (Adzaky et al., 2024). It is also consistent with evidence that combining safety stock with reorder point strengthens a company's raw-material monitoring and ordering system (Brahmantyo et al., 2023). The findings likewise align with case evidence that a structured replenishment method keeps total inventory cost lower than purchasing based on estimation alone (Basyid & Kaspul, 2020).

The managerial implication is a staged implementation. First, validate unit prices, ordering costs, holding-cost rates, lead times, and practical pack sizes. Second, configure material-specific EOQ and ROP alerts in SAP. Third, establish exception rules for freshness, quality rejection, MOQ/MOD, and supply disruption. Fourth, review KPIs monthly and recalibrate the parameters. This staged approach combines analytical discipline with the operating constraints of the seasoning supply system.

5. Conclusion

This study develops an EOQ-based decision framework for seasoning raw-material inventory at PT XYZ. The September 2025 baseline showed that opening stock for most priority materials was below production requirement plus the existing safety-stock allowance. The imbalance was associated with supplier MOQ/MOD rules, price and quality variability, harvest disruption, and the absence of a consistently applied quantitative replenishment rule.

For the eight priority materials, EOQ ranged from 93 kg for lemongrass to 916 L for palm oil, with material-specific safety-stock and ROP values. The results provide a transparent basis for distinguishing frequent, smaller replenishment of fresh ingredients from larger, less frequent ordering of storage-stable inputs. The framework should be integrated with PPIC scheduling, supplier monitoring, quality inspection, and SAP-based inventory and production data.

The study's theoretical contribution is the integration of a classical EOQ-SS-ROP calculation with perishable-material risk and production-planning coordination in a heterogeneous seasoning portfolio. Its practical contribution is an implementable set of order-quantity, reorder-timing, system, and KPI recommendations. Because no post-implementation measurement was conducted, future research should compare inventory cost, stockout, waste, supplier performance, and production attainment before and after implementation and should test service-level-based safety stock using longer demand and lead-time histories.

References

Adzaky, M. R., Erlina, R., & Ambarwati, D. A. S. (2024). Analysis of Raw Material Inventory Control with Using Economic Order Quantity (EOQ) Method. *Journal of Business Management and Economic Development*, *2*(03), 1321–1334. https://doi.org/10.59653/jbmed.v2i03.977

Ardani et al. (2024). *Analisis Pengendalian Persediaan Pasir Silika dengan Metode EOQ dan JIT pada PT. ABC*. *8*(4), 2603–2613.

Basyid & Kaspul. (2020). *Analisis Pengendalian Persediaan Bahan Baku Dengan Metode Econimic Order Quantity (EOQ) Pada CV . Triputra Jaya Makmur*. *2*(2), 1–14.

Brahmantyo, R. A., Wibowo, J., Nurcahyawati, V., Informasi, S., & Dinamika, U. (2023). *Manajemen Persediaan Menggunakan Metode Safety Stock dan Reorder Point*. *9*(April), 89–99. https://doi.org/10.34128/jsi.v9i1.431

Fajlur, M., & Nursyamsiah, S. (2023). *Pengaruh Praktik Manajemen Persediaan terhadap Kinerja Perusahaan yang Dimediasi oleh Pengetahuan Manajemen Persediaan : Studi Empiris pada Toko Ritel di D . I . Yogyakarta*. *02*(05), 194–206.

Gołaś, Z. (2020). The effect of inventory management on profitability: Evidence from the Polish food industry: Case study. *Agricultural Economics (Czech Republic)*, *66*(5), 234–242. https://doi.org/10.17221/370/2019-AGRICECON

Handayani dan Afrianandra. (2022). *Analisis Pengendalian Persediaan Bahan Baku Dengan Menggunakan Metode Economic Order Quantity (EOQ) Dalam Menetapkan Periodic Order Quantity (POQ) (Studi Kasus Pada Pabrik Tempe Soybean)*. *7*(2), 308–323.

Jay, H., Render, B., & Munson, C. (2022). T Welf T H Edit Ion Oper At Ions. In *Sustainability (Switzerland)* (Vol. 11, Issue 1). http://scioteca.caf.com/bitstream/handle/123456789/1091/RED2017-Eng-8ene.pdf?sequence=12&isAllowed=y%0Ahttp://dx.doi.org/10.1016/j.regsciurbeco.2008.06.005%0Ahttps://www.researchgate.net/publication/305320484_SISTEM_PEMBETUNGAN_TERPUSAT_STRATEGI_MELESTARI

Larutama, W., Suyatno, A., Putri, A., Lubis, R., & Camellia, N. H. (2023). *Journal of Logistics and Supply Chain*. *3*(1), 35–44.

Marsetiya, D., Agustin, W., Utama, S. C., Marsetiya, D., & Agustin, W. (2022). *Integrated procurement-production inventory model in supply chain : A systematic review*.

Namwad, R. S., Mishra, N. K., Ranu, & Jain, P. (2024). Optimizing Inventory Management with Seasonal Demand Forecasting in a Fuzzy Environment. *Journal Europeen Des Systemes Automatises*, *57*(4), 1091–1102. https://doi.org/10.18280/jesa.570416

Nazwa, A., Eriswanto, E., & Order, E. (2024). *Analisis Pengelolaan Persediaan untuk Meningkatkan Efisiensi Biaya Persediaan Bahan Baku dalam Upaya Meningkatkan Laba*. *5*(November), 77–87.

Pradana dan Jakaria. (2020). *Pengendalian Persediaan Bahan Baku Gula Menggunakan*. *16*, 43–48.

Santoso, R. W., Siagian, H., Jiwa, Z., & Tarigan, H. (2022). *Assessing the Benefit of Adopting ERP Technology and Practicing Green Supply Chain Management toward Operational Performance : An Evidence from Indonesia*. 1–21.

Sbai, N., & Berrado, A. (2023). *Simulation-Based Approach for Multi-Echelon Inventory System Selection : Case of Distribution Systems*.

Susanti, N. I., & Wahyuningsih, H. D. (2023). *Sistem Informasi Manajemen Persediaan Menggunakan Metode Economic Order Quantity Dan Reorder Point*. *18*(2), 208–219.

Triagustin dan Himawan. (2022). *Jurnal Ekobistek*. *11*. https://doi.org/10.35134/ekobistek.v11i4.404

Vega & Nayat. (2022). Effective Inventory Management System in Efficient Supply and Distribution Management in one of Manufacturer of Foods Seasoning Products in the Philippines. *2021 International Conference on Information Management, Innovation Management and Industrial Engineering (ICIII)*, *April 2022*. https://doi.org/10.1109/ICIII53469.2021.00033

World Instant Noodles Association. (2024).

Zahra et al. (2025). *Inventory Management As The Key To Improving The Company ' s Operational Performance (Manajemen Persediaan Sebagai Kunci Peningkatan Kinerja Operasional Perusahaan)*. *3*(3), 418–428.