




Snack Supply Information System at UD Bunda Ida Using the EOQ Method

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 <https://doi.org/10.37339/e-komtek.v10i1.3209>

Published by Piksi Ganesha Polytechnic Indonesia

Article Info

Submitted:

26-05-2026

Revised:

23-06-2026

Accepted:

23-06-2026

Online first :

30-06-2026

Abstract

This research aims to design an integrated inventory information system with the Economic Order Quantity (EOQ) method, equipped with safety stock and reorder points, to assist stores in optimizing inventory control. The EOQ method is used to determine the number of orders that are economical so that it can minimize the total cost of inventory. The developed system not only calculates EOQ, but also manages inventory data in real-time, provides notifications of near-expired products, and re-order recommendations. This study fills the gap from previous studies that are still limited to semi-manual or unintegrated systems. The design results show that the EOQ-based information system is able to improve the efficiency of inventory management, reduce the risk of overstock and stock shortages, and support more accurate decision-making. Thus, this system is expected to help UD Bunda Ida in providing optimal service to consumers while increasing business profits.

Keywords: *Inventory, EOQ, Information System, SMEs*

Abstract

Penelitian ini bertujuan merancang sistem informasi persediaan terintegrasi dengan metode Economic Order Quantity (EOQ), dilengkapi dengan safety stock dan reorder point, untuk membantu toko dalam mengoptimalkan pengendalian persediaan. Metode EOQ digunakan untuk menentukan jumlah pemesanan yang ekonomis sehingga dapat meminimalkan total biaya persediaan. Sistem yang dikembangkan tidak hanya menghitung EOQ, tetapi juga mengelola data persediaan secara real-time, memberikan notifikasi produk yang mendekati kedaluwarsa, serta rekomendasi pemesanan ulang. Penelitian ini mengisi kesenjangan dari studi terdahulu yang masih terbatas pada sistem semi-manual atau tidak terintegrasi. Hasil perancangan menunjukkan bahwa sistem informasi berbasis EOQ mampu meningkatkan efisiensi pengelolaan persediaan, mengurangi risiko overstock maupun kekurangan stok, serta mendukung pengambilan keputusan yang lebih akurat. Dengan demikian, sistem ini diharapkan dapat membantu UD Bunda Ida dalam memberikan pelayanan optimal kepada konsumen sekaligus meningkatkan keuntungan usaha.

Kata-kata kunci: *Persediaan, EOQ, Sistem informasi, UMKM*



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1. Introduction

The rapid development of information technology has had a significant impact on various aspects of life, including the business and business world. The use of technology allows business actors to innovate, improve operational efficiency, and provide optimal information services to consumers through computer-based, laptop, and smartphone-based systems. One of the sectors that has also felt the impact of technological developments is the food trading business, which is now required to be able to manage inventory effectively in order to meet consumer needs in a timely manner [1].

UD Bunda Ida, a snack store established in 1997 in Medan City, is an example of a rapidly growing business with more than 100 types of products in collaboration with MSMEs. The store has two branches and recorded sales of ±127 million in six months. However, inventory management is still carried out simply without a structured system, so there are often problems such as overstock, delays in checking expiration periods, and uncertainty about the amount of stock. This condition not only causes financial losses due to wasteful storage costs, but also has the potential to reduce the quality of service to consumers [2].

Good inventory management has actually been a concern for a long time. The story of the Prophet Yusuf AS in the Qur'an (QS. Yusuf: 47–49) provides important lessons on wise and measurable stock management, which is relevant to the principle of Economic Order Quantity (EOQ). EOQ is a method used to determine the optimal number of orders so that it can reduce total inventory costs, and is equipped with the concept of safety stock and reorder points to anticipate sudden stock shortages [3].

The previous research that is the author's reference in this study is by Sugeng Setyabudi and Rizqi Novita Sari (2024) in their journal entitled Analysis of Cireng Raw Material Inventory in Company XYZ Using the EOQ Method Using POM-QM Software [4]. The study uses POM-QM software for EOQ calculations, which is analytical and not integrated with the company's operational system, the use of separate analysis tools without integration into the operational information system can limit the efficiency and accuracy of decision-making. Meanwhile, in the research, the author developed an integrated information system that not only calculates EOQ, but also manages inventory data in real-time. Then research by Katiandagho and Trisyanto (2021) has applied EOQ, safety stock, and reorder point methods in controlling raw material inventory in restaurant businesses [5]. However, the research is still limited to wet food raw materials with a short shelf life and uses a semi-manual system based on Microsoft Excel. There has been no similar research applied to the snack industry with different finished product characteristics, especially in the context of MSMEs such as UD Bunda Ida. In addition, there is no integrated information system that facilitates the automation of inventory management with the EOQ

approach. Therefore, this study aims to fill this gap by designing a snack inventory information system using the automated EOQ method, in order to improve the efficiency of inventory control and reordering decision-making at UD Bunda Ida.

Based on these problems, this study aims to design and implement a web-based snack inventory information system at UD Bunda Ida using the EOQ method, equipped with safety stock and reorder points. This system is expected to be able to improve inventory control efficiency, minimize storage costs, and support more accurate reordering decision-making.

2. Method

This study uses a quantitative method, which is an approach that produces findings through statistical procedures and data quantification. Quantitative methods rely on numerical data as well as statistical analysis to collect, process, and interpret information [6]. The data used includes product sales, ordering costs, and storage costs. All data is entered into the Economic Order Quantity (EOQ) formula, then the calculation results are applied into the system to compare costs before and after the implementation of EOQ. Thus, the effectiveness of the system can be measured quantitatively. The data collection method is by:

1. Observation: carried out by direct observation at UD Bunda Ida to obtain data on operational activities.
2. Literature Study: conducted by reviewing books, e-books, and journal articles related to inventory management and EOQ methods.
3. Interview: conducted with the shop owner (Bunda Ida) to obtain information about inventory problems and system needs.

2.1. EOQ method

Economic Order Quantity (EOQ) is an inventory technique that determines how much is an economical order every time an order is placed with a predetermined frequency and when the order is reordered [7]. The use of the EOQ method can consider the existence of safety stock and reorder points, so that with the existence of safety stock and reorder points, in the event of sudden orders, the warehouse has inventory and knows when to place a reorder [8]. The control work steps with the EOQ method are as follows:

1. Identify necessary data such as product sales, order costs, storage costs and order time.

2. The calculation uses the EOQ formula to get the EOQ value which is the optimal order quantity.
3. Use EOQ values as a guide to manage inventory.
4. Use the safety stock formula to find out the minimum amount of snacks so that they can be reordered according to the order time calculated with the reorder point formula

Here are the formulas:

1. EOQ Formula

To calculate with the EOQ method, a formula is used, namely:

$$EOQ = \sqrt{\frac{2DS}{H}} \quad (1)$$

Description :

EOQ = optimal purchase quantity

D = use or sale of products

S = booking fee

H = storage cost per unit

2. Stock Safety Formula

The EOQ method is also designed with *safety stock in mind*. The formula is:

$$SS = Z \times d \times L \quad (2)$$

Description :

SS = *safety stock*

Z = Service level

d = average sales

L = *lead time* (waiting time between the order and the goods arrived)

3. Reorder Point Formula

After calculating *the safety stock* (SS), it is to look for a *reorder point* (ROP). The purpose of ROP is to determine when is the right time to reorder products. The ROP formula is:

$$ROP = (d \times L) + SS \quad (3)$$

Description :

ROP = the right amount of stock for reordering

d = average sales

L = *lead time* (waiting time between the order and the goods arrived)

SS = *safety stock*

2.2. System Development Methods

The information system in this study was developed using the *Waterfall*, i.e. a linear and sequential software development model [9]. Each stage must be completed first before proceeding to the next stage, thus minimizing process repetition and ensuring results as needed[10]. The main stages of the Waterfall method include:

1. System Analysis – identifies user needs, inventory issues, and required system functions.
2. System Design – designing the architecture, data structure, user interface, and system components as needed.
3. Implementation – translate the design into a programming language (PHP 8, Laravel, MySQL, Bootstrap 5) and build the system as designed.
4. Testing – performs functionality, integration, and performance tests to ensure the system is running to specifications.
5. Deployment and Maintenance – systems are installed on production servers, user training is conducted, and maintenance is carried out to fix bugs and improve performance.

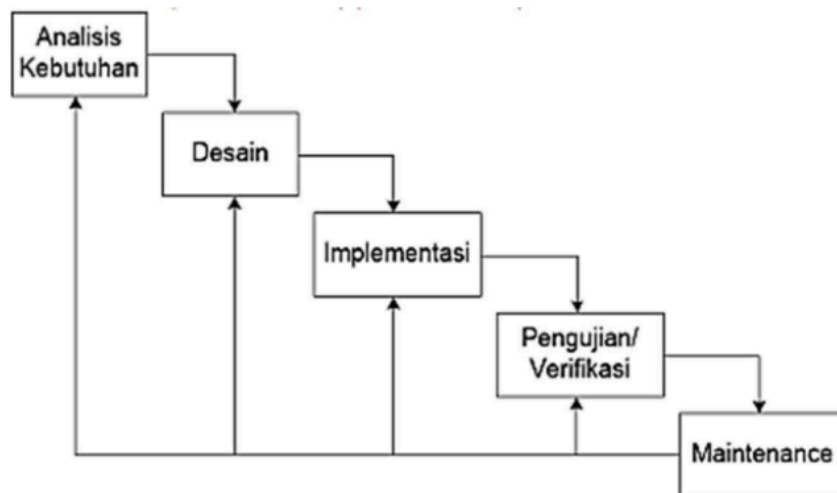


Figure 1. Stages of the SDLC Waterfall Method

3. Results and Discussion

3.1. EOQ Analysis

In EOQ analysis, the booking fee can be calculated based on the telephone cost and shipping cost which is Rp 20000.-, the storage fee is 26% and the service level is 98% or equal to 2.05 service factors. After all the data is collected, which is as many as 100 products, then it will be calculated using the EOQ method and also safety stock and reorder points, here is the calculation of one of the 100gr Kuaci Chacha snacks:

- EOQ Calculation

$$EOQ = \sqrt{\frac{2DS}{H}}$$

$$EOQ = \sqrt{\frac{2 \times 302 \times 20000}{3016}} = 63$$

- Safety Stock Calculation

$$Safety\ Stock = Z \times d \times L$$

$$Safety\ Stock = 2,05 \times 2,52 \times 2 = 10$$

- ROP calculation

$$ROP = (d \times L) + SS$$

$$ROP = (2,52 \times 2) + 10 = 15$$

For other analysis results, you can see the following table:

Table 1. EOQ Analysis Results

No.	Food Name	Sales Quantity	Z	d	L	SS	ROP	EOQ
1.	Chacha Cake 100gr	302	2,05	2,52	2	10	15	63
2.	JF Shrimp Pastel	165	2,05	1,38	2	6	8	29
3.	Fan Cap 500gr	60	2,05	0,50	2	2	3	19
4.	Candied Salak/Mango	366	2,05	3,05	2	13	19	35
5.	Potato Steak	70	2,05	0,58	2	2	4	23
6.	Salted Beans	340	2,05	2,83	2	12	17	54
7.	Coconut Fan Lok	280	2,05	2,33	2	10	14	38
8.	Color Contents 70	72	2,05	0,60	2	2	4	23
9.	Laughter Bread 500gr	112	2,05	0,93	2	4	6	26
10.	Jumbo Laughter Bread	417	2,05	3,48	2	14	21	65
11.	Nastar Daun	228	2,05	1,90	2	8	12	36
12.	Banana Chips 500gr	457	2,05	3,81	2	16	23	58
13.	Annisa Onion Cake	490	2,05	4,08	2	17	25	52
14.	Pastry	217	2,05	1,81	2	7	11	40
...								

100.	Elephant Ears 500gr	148	2,05	1,23	2	5	8	32
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It can be seen in the table above that for 100gr Kuaci Chacha snacks, a reorder will be made if the stock of 100gr chacha snacks reaches 15 pcs, with the number ordered being as much as 63 pcs and the safety stock that must always be in the store is 10 pcs.

3.2. Process Design

The system design is carried out to provide an overview of the information system to be built. The actors involved are sales employees or cashiers and warehouse employees. The following is a use case diagram of the system designed.

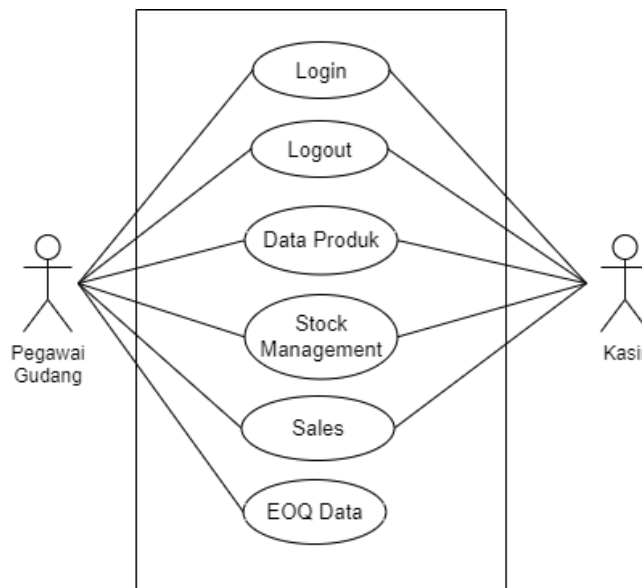


Figure 2. Use Case Diagram

The following is the designed login activity diagram

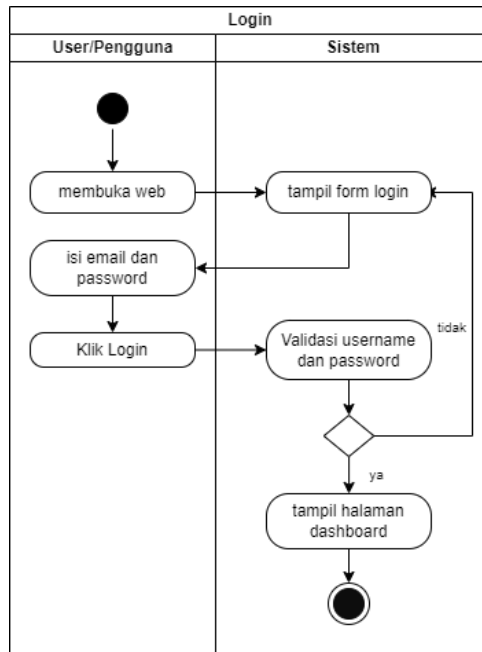


Figure 3. Activity Diagram Login

The following is the sales activity diagram designed

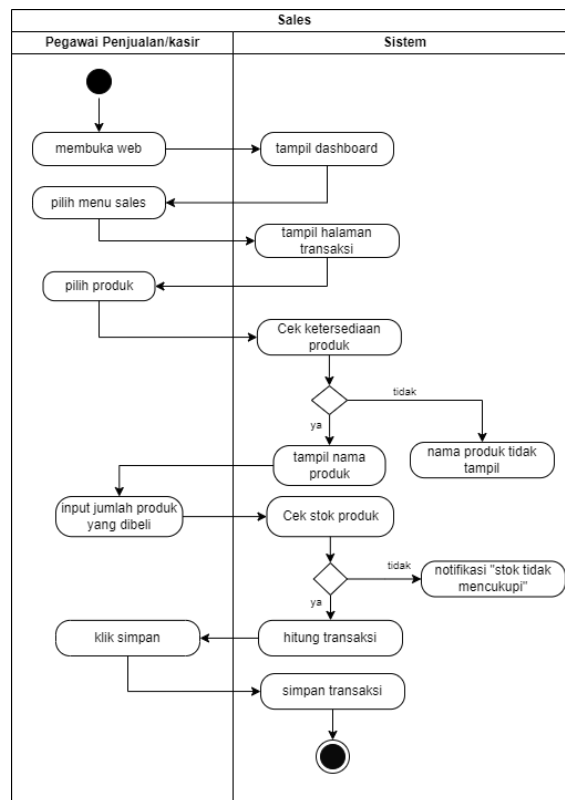


Figure 4. Activity Diagram Sales

The following is the EOQ activity diagram designed

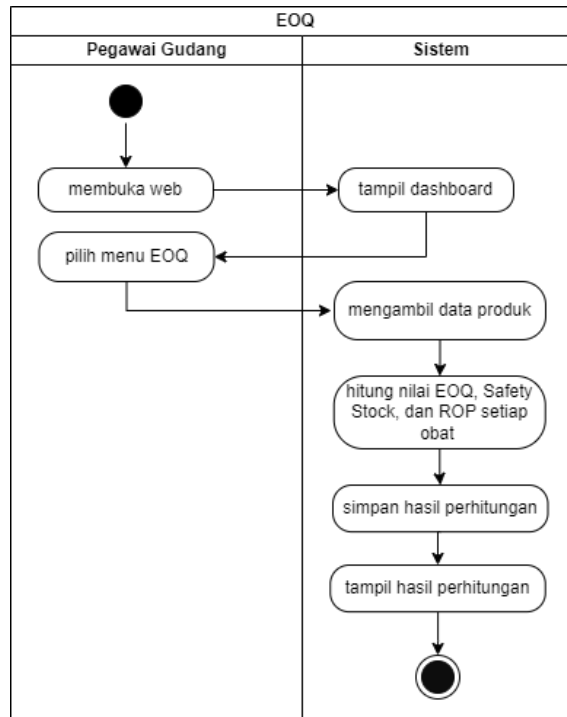


Figure 5. Activity Diagram EOQ

3.3. Implementation

After the information system is designed, the next stage is the implementation stage of the design into a system that can be used. The following are the views of the information system that were created.

A. Login Page

The home page when you first open the system. All users (cashier and warehouse employee) must log in first by filling in the email and password correctly.

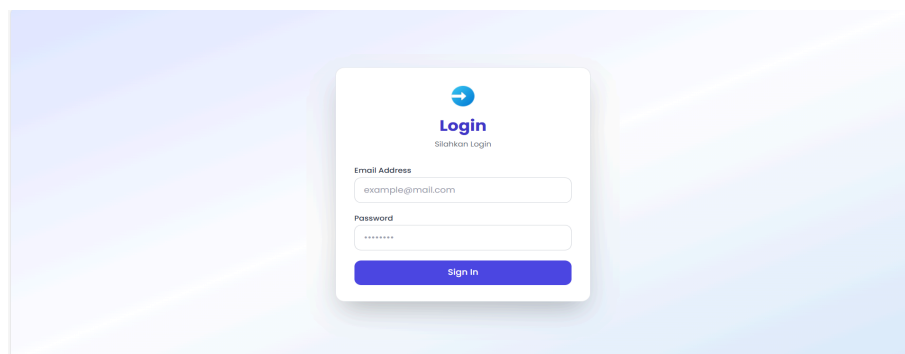


Figure 6. Login View

B. Dashboard Page

This page is the starting page after the user successfully logs in to the system. The dashboard page displays a summary of total sales, revenue, sales and sales graphs.

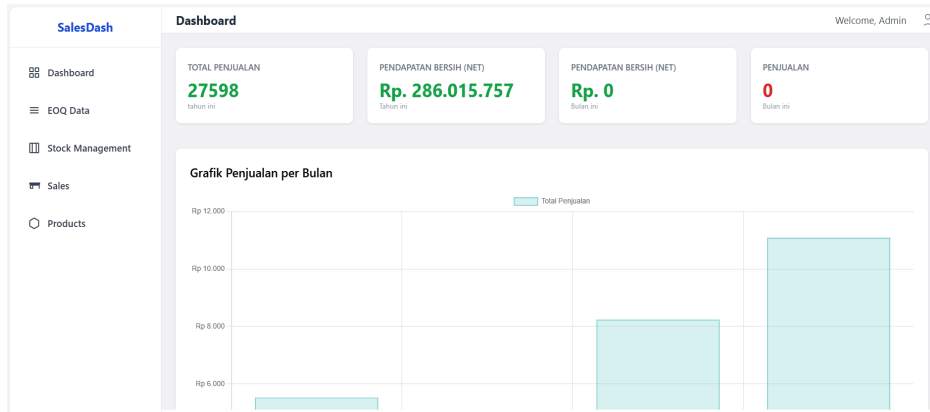


Figure 7. Snack inventory system dashboard view

C. EOQ Data Page

This page displays the results of the EOQ calculation automatically on all snack products, equipped with the results of the safety stock calculation and reorder points. Users can view the calculation results for a specific month by selecting the month of the beginning of the calculation to the month of the end of the calculation.

The EOQ data display page includes a table with the following columns: Nama Produk, Satuan, Harga Supplier, Harga Jual, Kadaluarsa, Terjual, Rata-rata Harian, Biaya Simpan, EOQ, Safety Stock, Reorder Point, and Stok Saat Ini. The data is filtered for the period from January to April.

Nama Produk	Satuan	Harga Supplier	Harga Jual	Kadaluarsa	Terjual	Rata-rata Harian	Biaya Simpan	EOQ	Safety Stock	Reorder Point	Stok Saat Ini
ALEN-ALEN	pcs	27350	41500	2026-04-26	390	24.37500000	4179.20	31	2	26	428
ALPELLA LAYER PANDAN	pcs	19570	29357	2026-02-26	240	15.00000000	2935.70	29	1	16	264
ANEKA COKLAT 20RB	pcs	28888	45844	2026-01-30	500	31.25000000	4584.40	33	3	33	549
ANGKA 8 SEDANG	pcs	21662	31942	2026-03-08	422	26.37500000	3194.20	36	2	28	464
ARAB DAUN JERUK	pcs	19077	28220	2026-02-07	488	30.50000000	2822.00	42	3	32	537
ARAB PEDAS 4KG	pcs	28899	38073	2025-12-30	110	6.87500000	3807.30	17	1	7	122
ASTEEN ASTOR	pcs	18017	20142	2025-12-10	60	3.75000000	2014.20	14	0	4	66

Figure 8. EOQ Data Display

D. Stock Management Page

This page is a page that displays the amount of stock for each product and is used to manage snack stock by using the stock update button to increase stock.

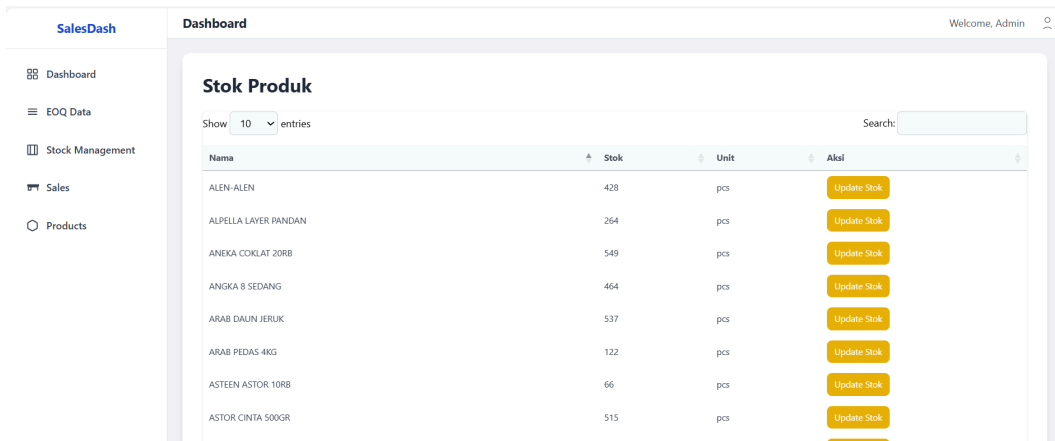


Figure 9. Snack Stock Management View

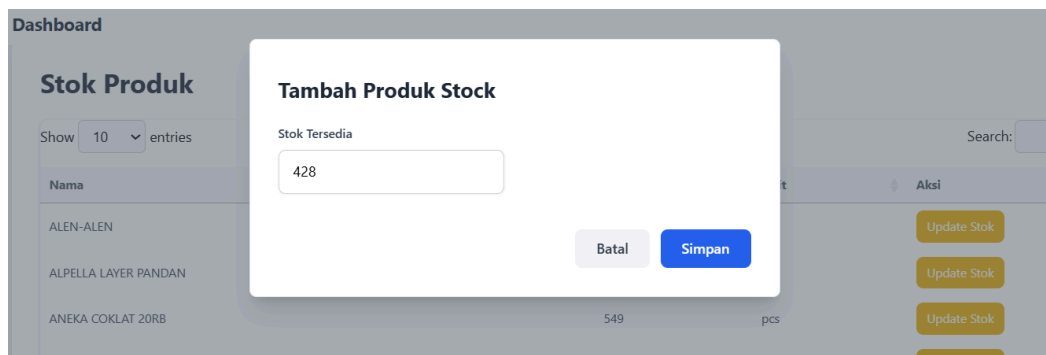


Figure 10. Product stock update view

E. Sales Page

This page is a page for making sales transactions, where users can select each product purchased by the customer, then calculate the total purchased.

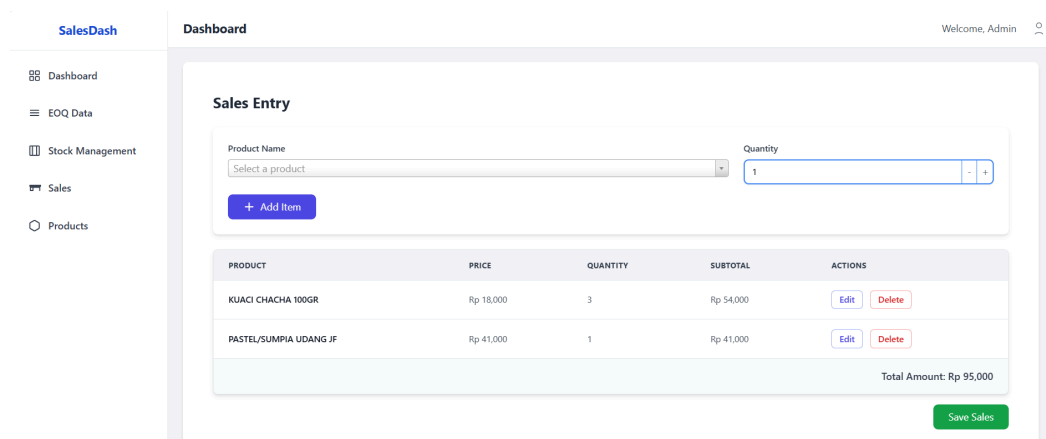


Figure 11. Sales/Sales view

F. Products Page

This page is a page to view details of snack data. Admins can add product data through this page by clicking the add button at the top of the table and on each product there is an edit button to edit the product and a delete button to delete the product.

Nama	Unit	Harga Supplier	Harga Jual	Expired	Aksi
ALEN-ALEN	pcs	Rp 27.350,00	Rp 41.500,00	2026-04-26	Edit Hapus
ALPELLA LAYER PANDAN	pcs	Rp 19.570,00	Rp 29.357,00	2026-02-26	Edit Hapus
ANEKA COKLAT 20RB	pcs	Rp 28.888,00	Rp 45.844,00	2026-01-30	Edit Hapus
ANGKA 8 SEDANG	pcs	Rp 21.662,00	Rp 31.942,00	2026-03-08	Edit Hapus
ARAB DAUN JERUK	pcs	Rp 19.077,00	Rp 28.220,00	2026-02-07	Edit Hapus
ARAB PEDAS 4KG	pcs	Rp 28.899,00	Rp 38.073,00	2025-12-30	Edit Hapus
ASTEEN ASTOR 10RB	pcs	Rp 18.917,00	Rp 29.142,00	2025-12-10	Edit Hapus
ASTOR CINTA 500GR	pcs	Rp 25.445,00	Rp 33.716,00	2026-02-10	Edit Hapus

Figure 12. Snack Product Detail View

The comparison of costs incurred in the calculation of snack supplies that has been carried out by UD Bunda Ida and the calculation using the EOQ method. The following are the inventory costs carried out by UD Bunda Ida without using the method.

Table 2. Store Inventory

No.	Food Name	Total Inventory	Product Pricing	Inventory Cost
1.	Chacha Cake 100gr	120	IDR 11,600	IDR 1,392,000
2.	JF Shrimp Pastel	75	IDR 29,500	IDR 2,212,500
3.	Fan Cap 500gr	65	IDR 26,200	IDR 1,703,000
4.	Candied Salak/Mango	70	IDR 46,150	IDR 3,230,500
5.	Potato Steak	70	IDR 20,500	IDR 1,435,000
6.	Salted Beans	130	IDR 18,000	IDR 2,340,000
7.	Coconut Fan Lok	100	IDR 29.100	IDR 2,910,000
8.	Color Contents 70	79	IDR 21,500	IDR 1,698,500
9.	Laughter Bread 500gr	95	IDR 24,800	IDR 2,356,000
10.	Jumbo Laughter Bread	212	IDR 15,150	IDR 3,211,800
11.	Nastar Daun	90	IDR 27,650	IDR 2,488,500
12.	Banana Chips 500gr	156	IDR 21,200	IDR 3,307,200
13.	Annisa Onion Cake	198	IDR 27,850	IDR 5,514,300
14.	Pastry	150	IDR 20,900	IDR 3,135,000

...				
100.	Elephant Ears 500gr	95	IDR 21,900	IDR 2,080,500
				Total: IDR 256.838.900

The following is a table of inventory cost calculations calculated using the EOQ method.

Table 3. Inventory Based on EOQ Calculations

No.	Food Name	EOQ	Product Pricing	Inventory Cost
1.	Chacha Cake 100gr	63	IDR 11,600	IDR 734.135
2.	JF Shrimp Pastel	29	IDR 29,500	IDR 865,359
3.	Fan Cap 500gr	19	IDR 26,200	IDR 491,779
4.	Candied Salak/Mango	35	IDR 46,150	IDR 1.612.017
5.	Potato Steak	23	IDR 20,500	IDR 469.861
6.	Salted Beans	54	IDR 18,000	IDR 970,329
7.	Coconut Fan Lok	38	IDR 29.100	IDR 1.119.615
8.	Color Contents 70	23	IDR 21,500	IDR 488.010
9.	Laughter Bread 500gr	26	IDR 24,800	IDR 653.700
10.	Jumbo Laughter Bread	65	IDR 15,150	IDR 985.865
11.	Nastar Daun	36	IDR 27,650	IDR 984,823
12.	Banana Chips 500gr	58	IDR 21,200	IDR 1,220,870
13.	Annisa Onion Cake	52	IDR 27,850	IDR 1,448,952
14.	Pastry	40	IDR 20,900	IDR 835.307
...				
100.	Elephant Ears 500gr	32	IDR 21,900	IDR 706,149
				Total: IDR 94,853,264

It can be seen in table 2. The total inventory cost incurred by the store for the supply of 100 types of snacks is as much as IDR 256,838,900, and can be seen in table 3. That the total cost of inventory based on the EOQ value is IDR 94,853,264, so it can be known that the costs incurred with inventory using the EOQ value are much lower than the inventory used by the store.

4. Conclusion

Based on the discussion above, it can be concluded that the snack inventory information system that was built was successfully implemented, where calculations using the EOQ method can also be carried out. And based on the calculation of inventory without using the EOQ method and with the EOQ method, it was found that the total inventory cost incurred by UD Bunda Ida for the inventory of 100 types of snacks was IDR 256,838,900 and the total inventory

cost based on the EOQ value was IDR 94,853,264. So that the costs incurred using the EOQ method are lower than the total costs incurred without using the EOQ method.

References

- [1] S. A. Rachmawati, L. Syafirullah, and M. N. Faiz, "Perancangan Sistem Pengendalian Persediaan Barang Menggunakan Metode Eoq Dan Rop Berbasis Web," *Semin. Nas. Terap. Ris. Inov. Ke-6*, vol. 6, no. 1, pp. 778–786, 2020.
- [2] Jonatan Persada Siregar, Rektor Sianturi, and Debora Exaudi Sirait, "Analisis Pengendalian Persediaan Barang Menggunakan Metode EOQ," *J. Ilmu Pendidik. dan Sos.*, vol. 2, no. 3, 2023, doi: 10.58540/jipsi.v2i3.445.
- [3] F. Jiroyah and Sumarsono, "Analisis Pengendalian Persediaan Bahan Baku Di Ukm Batik Sekar Jati Star Dengan Menggunakan Metode Abc Analysis Dan Economic Order Quantity (Eoq)," *J. Penelit. Bid. Inov. Pengelolaan Ind.*, vol. 1, no. 01, pp. 32–41, 2021, doi: 10.33752/invantri.v1i01.1829.
- [4] Sugeng Setyabudi and Rizqi Novita Sari, "Analisis Persediaan Bahan Baku Cireng Pada Perusahaan XYZ Dengan Metode EOQ Menggunakan Software POM-QM," *Jupiter Publ. Ilmu Keteknikan Ind. Tek. Elektro dan Inform.*, vol. 2, no. 3, pp. 192–199, 2024, doi: 10.61132/jupiter.v2i3.331.
- [5] I. G. Katiandagho and R. Trisyanto, "Analisis dan Perancangan ROP, EOQ, Safety Stock Sistem Pengendalian Persediaan Bahan Baku Pada Rumah Makan Bubur Ayam Citarasa," *Indones. Account. Lit. J.*, vol. 2, no. 1, pp. 45–65, 2022, doi: 10.35313/ialj.v2i1.3231.
- [6] Zendrato Rahmat Juniarif, Triase, and Alda Muhamad, "Implementasi Sig Pada Promosi Dan Identifikasikawasan Berpotensi Pengembangan Agrowisata Wilayah Karo Menggunakan Metode Regresi Geografis Berbasis Web," *J. Sci. Soc. Res.*, vol. 7, no. 2, pp. 504–514, 2024.
- [7] V. Nurcahyawati, Riyondha Aprilian Brahmantyo, and Januar Wibowo, "Manajemen Persediaan Menggunakan Metode Safety Stock dan Reorder Point," *J. Sains dan Inform.*, vol. 9, no. April, pp. 89–99, 2023, doi: 10.34128/jsi.v9i1.431.
- [8] M. A. Nugraha, Y. Septiana, and D. D. S. Fatimah, "Rancang Bangun Human Resource Information System Berbasis Web," *J. Algoritma*, vol. 19, no. 2, pp. 701–711, 2022, doi: 10.33364/algoritma/v.19-2.1189.
- [9] B. N. Maharani, M. I. P. Nasution, and Triase, "Sistem Informasi Payroll Pegawai dengan Absensi QR Code," *J. Inform. dan Teknol. Pendidik.*, vol. 1, no. 1, pp. 23–35, 2021, doi: 10.25008/jitp.v1i1.9.
- [10] S. Suendri, A. M. Harahap, A. B. Nasution, and S. Kartika, "Analisis Sistem Pendukung Keputusan Penentuan Lulusan Terbaik Menggunakan Lima Algoritma Pada Program Studi Sistem Informasi UIN Sumatera Utara Medan," *Al-Ulum J. Sains Dan Teknol.*, vol. 7, no. 1, pp. 38–43, 2022, doi: 10.31602/ajst.v7i1.5839.