



## *E-Commerce Based Website With Method Economic Order Quantity (EOQ)*

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### ABSTRACT

*Based on the observations it can be seen that problems in Tumblertees sales transaction process is still done manually which led to the possibility of human error that would result in misinformation and also experience problems with over-stock so that the proper stock management is needed in order to avoid waste of product purchase. This study build an e-commerce based website by using the waterfall model as the development of the system and apply the method Economic Order Quantity (EOQ) to facilitate the ordering process, the sale and purchase of products on Tumblertees. The test results showed that the use of the method of Economic Order Quantity (EOQ) is able to reduce costs to support the increase in sales turnover.*

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## 1. Introduction

The rapid development of information technology and software makes the buying and selling of conventional becomes possible to be done electronically. It has made an online sales system as a means of promotion are cheap and affordable. Based on the results of interviews with the Tumblertees can know how the business processes that occur, namely in conducting its activities, Tumblertees still using the media to deliver information that is simple, so for the marketing of goods and services is still not maximized, even the supply of goods to over-stock for the purchase of products from a supplier does not controlled. In the process of ordering a product, the customer must contact via social media or come directly to the store to make the process of buying and selling.

Under the current conditions we propose on the use of the online system for the smooth process of e-commerce trade that using Economic Order Quantity (EOQ). Due to the building systems based e-commerce web will assist and facilitate buyers to search for product information, transaction ordering of goods and delivery of products as well as facilitate the seller in conducting all activities at stores such as reports and forecasting of inventory stock, transaction reports, update data products and reports on other activities.

In the study "Development of Management Information System Sales Fruit Chips on CV KAJEYE FOOD With Forecasting Method Requests Using Waterfall Model" produce information systems that can store data selling fruit chips on each sale so that sales information fruit chips can be stored and collected in a single database No on information systems [1]. While the research "Inventory Management Application Based Economic Order Quantity (EOQ)"Build applications using EOQ method aims to determine the sales and inventory control of medicines in Kimia Farma. The method was considered more appropriate method to provide solutions to problems that exist in the inventory. [2]. The same problem also occurs in the study "Analysis of Inventory Control Raw Materials Methods Economic Order Quantity And Kanban At PT Adyawinsa Stamping Industries", in this study menggunakanmetode EOQ to minimize the Total Inventory Cost to reduce costs of inventory so that the efficiency of the inventory goes well and can achieve the optimal number of units booking by pressing the lowest possible cost [3].



## 2. Research methods

### A. System planning

In designing this system the researchers used a flowchart diagram as an overview of the workflow system created to define the course of the program.

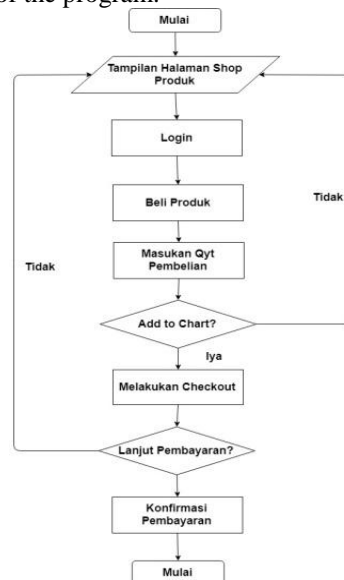


Fig 1. Flow System Ecommerce Tumblrtees

Figure 1 direct workflow to describe the program so that customers can make the purchase of goods, starting with the login, choose a product, to make a payment for the product to be purchased.

System development method used in this study is the waterfall model. Waterfall is a model that does a systematic and sequential approach in building a system [7]. The process of the waterfall method, namely the construction of a system made consecutively. The resulting system will be good quality, due to gradual implementation that is not focused on a particular stage.

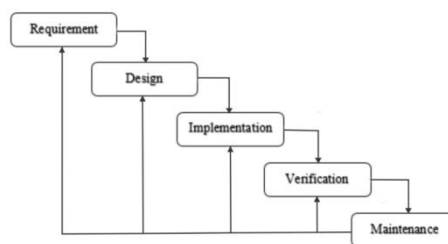


Fig 2. Method waterfall

Figure 2 is the stages that must be passed to the waterfall model, among others: needs analysis, system design, writing code, testing programs, as well as the implementation and maintenance program.

Data collection techniques used in relation to the needs of research, namely, observation and interviews. Observation done down to the field to observe the business activities such as buying and selling activities on Tumblrtees. While the interview is done directly to the owner Tumblrtees to obtain information related to the preparation of this thesis.

### B. Methods Economic Order Quantity (EOQ)

Calculation Methods of Economic Order Quantity (EOQ) is a technique to control the supply of products that aim to minimize the cost of supply of products or raw materials, with EOQ can determine the number of reservations (Order Quantity) to reduce the amount of the costs of ordering, storage and maintenance supplies, then is also used to estimate the exact schedule of the order goods in the future [3]. EOQ formula is as follows [3].



$$EOQ (Q^*) = \sqrt{\frac{2DS}{H}} \dots\dots\dots (1)$$

Where:

EOQ = economic order quantity (Q \*)

D = annual demand of products

S = The booking fee

H = Cost savings per year (15% x the unit price of the product)

From the EOQ formula above, the value of the cost savings gained by 15% per year as savings and cost reductions, tax and risk of depreciation of goods which have been agreed by the owner of the shop Tumblertees. After the EOQ value is obtained, then the next is to find optimum frequency values per-year bookings are symbolized by (F) and to determine the interval bookings symbolized by (V), with the following formula [6].

$$F = \frac{D}{Q^*} \dots\dots\dots (2)$$

Where :

F = Frequency optimal ordering

D = annual demand of products

Q \* = The optimal number of per-booking

$$V = \frac{R}{F} \dots\dots\dots (3)$$

Where :

V = Interval Booking

R = Number of days in the period

F = Frequency optimal ordering

To determine the cost of the product inventory used the following formula [6]:

a) Before using the EOQ

$$TC = \frac{D}{Q}S + \frac{Q}{2}H \dots\dots\dots (4)$$

b) After using the EOQ

$$TC = \frac{D}{Q^*}S + \frac{Q^*}{2}H \dots\dots\dots (5)$$

Where:

TC = total cost of product inventories

Q = Amount per-booking (booking is done every month)

Q \* = The optimal number of per-reservations (EOQ)

D = annual demand of products

S = The booking fee

H = Cost savings per year (15% x the unit price of the product)

### C. Data Flow Diagrams (DFD)

Data Flow Diagrams (DFD) shows the course of the system, the data of DFD can describe how the system works and as a reference in the design of the database system.

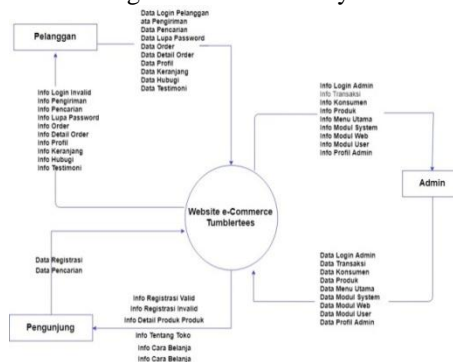


Fig 3. Context Diagram System E-Commerce

Figure 3 is a diagram showing the context of the overall system and describe how the scope of the system to be developed.



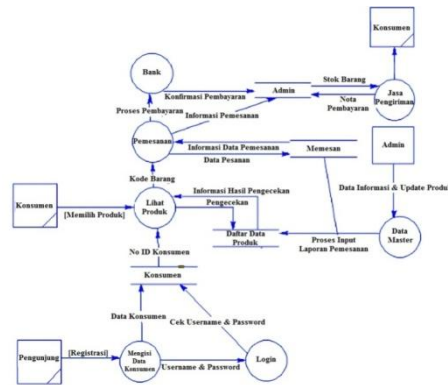


Fig 4. DFD Level 1 Order System E-Commerce

In Figure 4 above describes the information system of order processing system on the e-commerce Tumblrtees. Visitors must register to become a member in order to make purchases of products on the website Tumblrtees. After becoming a member, customers can make a purchase transaction processing products.

### 3. Results and Discussion

#### A. Calculation of Economic Order Quantity (EOQ)

At this stage, the EOQ calculation performed to determine the number of purchases that must be made in future periods. Examples of EOQ calculations for XY Titanium Case product using the formula (1) are as follows:

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

$$EOQ = \sqrt{\frac{2(1000)(300)}{(4500)}}$$

$$EOQ = 12 \text{ Units}$$

Table 1

EOQ Calculation Results of Six Product Samples at Tumblrtees January to December 2018

Product	Stock (unit)	Cost Pemesanan (USD)	Bid Price (USD)	EOQ / Q *
Titanium Case XY	300	1,000	30,000	12
macarons Case	350	1,000	25,000	14
Chrome Case	250	1,000	25,000	12
Ccarbon Case	300	1,000	25,000	13
titanium Case	400	1,000	30,000	13
Blink Case	350	1,000	30,000	12

(Source: Data processed)

From the calculation of EOQ, then the next step is to calculate the frequency of reservations should be made by Tumblrtees. Examples of ordering frequency calculations for XY Titanium Case products are as follows:

$$F = \frac{D}{Q^*}$$

$$F = \frac{300}{12} = 25 \text{ Kali}$$

In the year 2018 amounted to 360 Day assumed the interval ordering is as follows:

$$V = \frac{360 \text{ Hari}}{25} = 14,4 = 14 \text{ Hari Sekali}$$





Of formula (1), (2) and (3) produced the number and frequency of optimum bookings made by Tumblertees is 12 units as many as 25 times a year with a distance of 14 days.

**Table 2**

Results Calculation Amount and Frequency Order Products on Tumblertees January to December 2018

Product	Stock (unit)	EOQ / Q *	Booking frequency (times)	Booking period (days)
Titanium Case XY	300	12	25	14
macarons Case	350	14	25	14
Chrome Case	250	12	21	17
Ccarbon Case	300	13	23	16
titanium Case	400	13	31	12
Blink Case	350	12	29	12

(Source: Data processed)

### B. Analysis of Total Cost of Inventory Product

Inventories of products have been calculated using the EOQ produce economic quantities. To perform a cost comparison of inventory before and after using the EOQ method is done by using the formula (4) and (5).

- a) Before using the EOQ method, the captured data is data period 2018 bookings made each month is by booking as many as 12 times that known value of Q on XY Titanium Case product is 25 units. Q value can be searched by the following formula [6]:

$$Q = \frac{D}{\text{Periode Pemesanan}} \times \frac{300 \text{ unit}}{12 \text{ kali}} = 25 \text{ unit}$$

So that the total inventory costs accrued prior to using the EOQ method with Q = 25, are as follows:

$$TC = \frac{D}{Q} S + \frac{Q}{2} H$$

$$TC = \frac{300}{25} S + \frac{25}{2} 4500$$

$$TC = 12,000 + 56,250$$

$$TC = 68 250$$

- b) After using the EOQ method, with values EOQ Titanium Case product XY is 12 units or Q \* = 12.

$$TC = \frac{D}{Q^*} S + \frac{Q^*}{2} H$$

$$TC = \frac{300}{12} S + \frac{12}{2} 4500$$

$$TC = 25,000 + 27,000$$

$$TC = 52,000$$

**Table 3**

Cost Comparison Product Stocks in Tumblertees Before and After Using Method EOQ

Product	Cost of preparations (Before)	Cost of preparations (After)	Difference
Titanium Case XY	Rp 68 250	Rp 52,000	Rp 16,250
macarons Case	Rp 66 444	Rp 51 250	Rp 15 194
Chrome Case	Rp 51 280	Rp 43 333	Rp 7947
Ccarbon Case	Rp 58 875	Rp 47 452	Rp 11 423
titanium Case	Rp 86 371	Rp 60 019	Rp 26 352
Blink Case	Rp 77 318	Rp 56 167	Rp 21 151
<b>Total</b>	<b>USD 408 538</b>	<b>USD 310 221</b>	<b>Rp 98 317</b>

(Source: Data processed)

Table 3 is a cost savings of data showing that the use EOQ method causes the total cost of stocks decreased by USD 98 317, ie from Rp 408 538 to Rp 310 221.

### C. implementation interface

Implementation of the user interface created by writing code to translate the design of the system that has been made into a form that is understandable commands into a computer and display system.



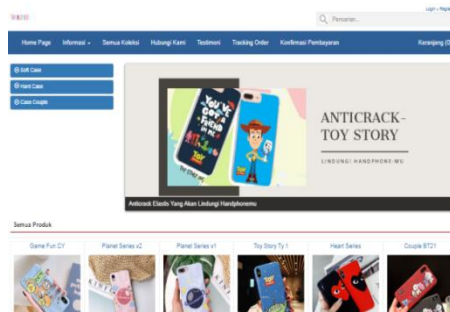


Fig 5. Home E-Commerce Tumlbertees

The main page in Figure 5 is the main menu that appears when visitors or customers into the website. On this page customers can view the products and categories of products sold by Tumlbertees (phone case).

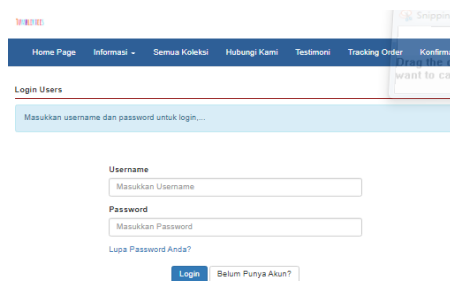


Fig 6. Customer Login page

Figure 6 shows the login page for the customers to be able to order products, give testimony, and send messages. But the menus can only be accessed by subscribers who already registered in e-commerce website Tumlbertees.

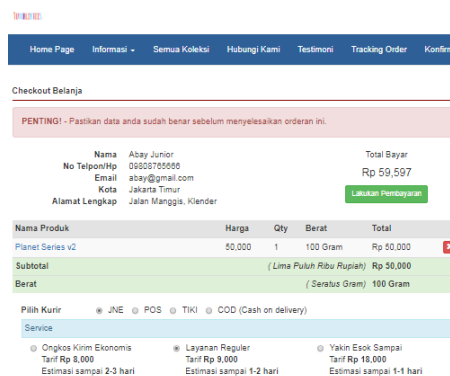


Fig 7. Page Checkout Customers

Checkout page in Figure 7 will appear if the customer has selected the product to be purchased. At this stage the customer is required to select shipping services and upload photos payments made by customers.



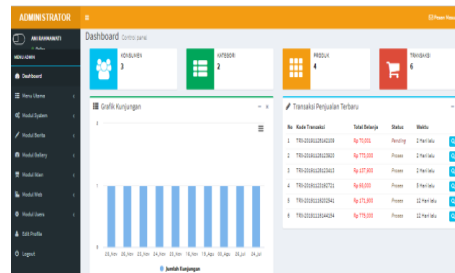


Fig 8. Admin Dashboard page

dashboard admin is shown in Figure 8 that contains menus that can be accessed by admin as the menu for managing the content of web pages and also to manage the existing deal ..

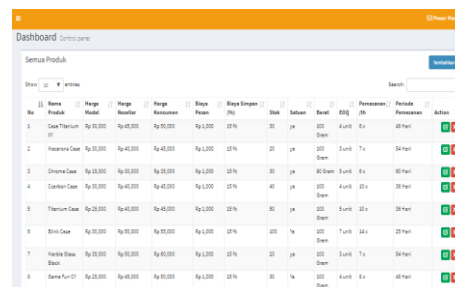


Fig 9. Page Add Product

Weather-added products is shown in Figure 9, in addition to adding details on the product page menu also includes forecasting inventory for the EOQ method results and optimal ordering frequency performed by Tumblertees.

#### 4. Conclusion

Based on the research that has been done, it can be concluded as follows:

- Facilitate e-commerce website owner or administrator to set up shop sales transactions, manage ordering raw materials, product sales, and purchase products.
- Tumblertees e-commerce website using EOQ method to determine the number of purchases of raw materials are economical and optimal ordering frequency so that no waste due to over-stock.
- By using EOQ method in many cost savings from stock data -Desembe January 2018 with a total cost of stocks decreased by USD 98 317, ie from Rp 408 538 to Rp 310 221.

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