CALCULATION CAPACITY PRODUCTION BASED ON THE LEVEL OF RAW MATERIAL NEEDS

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Introduction/Main Objectives: *This study aims to examine how UMKM Sate Abah Uteng, a Maranggi satay business established in 1990 in Plered, Purwakarta, manages raw material quality, production efficiency, and raw material planning in response to consumer demand.* ***Background Problems:*** *This research focuses on calculating production capacity based on the level of raw material requirements.* ***Novelty:*** *This study offers novelty by developing a practical production capacity calculation model based on raw material requirements in a traditional culinary MSME. Unlike previous studies that mainly discuss production capacity in formal manufacturing settings, this research focuses on a micro-scale Maranggi satay business where raw material freshness, demand fluctuation, and daily production planning directly affect operational efficiency. The contribution of this study is to provide a simple and applicable planning approach for aligning raw material procurement with production capacity and consumer demand .* ***Research Methods:*** *are used to analyze raw material needs and production capacity .* ***Findings/Results:*** *The initial EOQ calculation resulted in a zero value due to the assumption that ordering cost (S) was zero. Since ordering cost is an essential component of the EOQ formula, this assumption affects the validity of the result. Consequently, the EOQ outcome cannot be interpreted as an optimal ordering decision. This study therefore identifies the need to recalculate EOQ using realistic ordering cost components, including transportation, communication, administrative, and procurement-related costs, so that the optimal raw material order quantity can be determined more accurately. Production capacity is not limited by the availability of raw materials, but by the number of workers available. Daily production should be in the range of 200 to 500 skewers with a number of workers of 1 to 3 people.*
Keywords: *capacity production, EOQ, inventory*

1. PENDAHULUAN

1.1 Latar Belakang

Satay-based culinary MSMEs depend on the availability of raw materials to ensure smooth daily production. Therefore, effective inventory management is needed to maintain product quality, minimize production disruptions, and respond efficiently to consumer demand. In culinary MSMEs, raw material inventory practices vary depending on production needs, consumer demand patterns, and the perishability of ingredients. For satay-based MSMEs, this variation is particularly relevant because fresh meat and supporting ingredients require timely procurement, proper storage, and accurate quantity planning to prevent quality deterioration, overstocking, or stock shortages. Thus, raw material inventory management should be aligned with daily production capacity and demand estimation rather than treated as a fixed or uniform practice across all MSMEs. This is likely because each restaurant has a different production scale and yield.

Raw materials are a determining factor and crucial to the smooth production process for satay MSMEs. They must be utilized effectively and efficiently to generate profits for them, in addition to capital and labor. Therefore, every satay MSME must have a sufficient supply of raw materials to support satay production activities. If the supply of raw materials is hampered or production volume is limited and inconsistent, then production activities will be hampered. the production process will be hampered.

Delays in production due to inconsistent product quantities will impact output levels. This decrease in output will undoubtedly impact sales, resulting in satay MSMEs being unable to meet consumer demand. One way to utilize raw materials effectively and efficiently is to calculate production capacity based on raw material requirements.

MSME "Sate Bah Uteng" is one of the MSMEs in the Plered area, Purwakarta which Established in 1990, the restaurant belongs to Abah Uteng himself, which was then passed down to his children until now, the satay business began to grow rapidly in 2000. This MSME produces satay typical maranggi Plered Which have good quality with target The consumers of this restaurant are from all walks of life.

Based on field observations and interviews with the business owner, MSME Sate Bah Uteng faces two main operational problems: maintaining the quality of fresh raw materials and achieving consistent daily production. Empirical indications of these problems include [insert observation data, for example: variation in daily meat purchases, number of skewers produced per day, frequency of stock shortages, spoilage risk, or number of workers involved]. Therefore, this study aims to analyze raw material planning and production capacity to support more consistent and efficient satay production. And efficient then Also, There is problem difficulty in matter count the number need material standard to request. So that request Consumers are dissatisfied with the products of the Maranggi Satay restaurant. Based on the identified operational problems, this study aims to determine the production capacity of MSME Sate Bah Uteng by calculating raw material requirements in relation to daily consumer demand. This approach is expected to support more systematic production planning, reduce the risk of raw material shortages or excess inventory, and improve production efficiency. Inventory imbalance is a critical issue in culinary MSMEs. Insufficient raw material inventory can cause production disruptions, unmet consumer demand, and customer loss, whereas excessive inventory may lead to waste, cost inefficiency, and quality deterioration, particularly for perishable ingredients such as meat. Therefore, this study aims to calculate raw material requirements and estimate production capacity to support more efficient and quality-oriented production planning at MSME Sate Bah Uteng.

1.2 Latar Belakang

1. *Capacity Production*

   Production capacity is the maximum ability of a production facility to produce output in a certain time period (Heizer et al., 2019) Production capacity can be defined as the maximum feasible output that a business can produce within a specific period by considering resource availability and operational constraints. Recent studies on capacity planning emphasize that production capacity should be evaluated through the alignment between demand, available production time, labor, equipment, and raw material requirements. Thus, for culinary MSMEs such as Sate Bah Uteng, capacity planning is important to determine whether daily production targets can be achieved with the available workers, processing time, and raw materials. (Arifin, 2024) In other words, production capacity planning is deciding the maximum number of goods/services that can be produced in a certain time period.

   Production capacity is very important to plan and manage properly to meet market demand effectively and efficiently. Excessive production capacity can lead to wasted resources, while too little production capacity can lead to missed market opportunities (Heizer et al., 2017). Production capacity planning is particularly important for culinary MSMEs because their products depend on perishable raw materials and daily demand fluctuations. Excessive production capacity may cause waste of fresh ingredients, inefficient labor use, and additional operating costs. Meanwhile, insufficient capacity can result in unmet consumer demand, longer service times, lost sales, and reduced customer satisfaction. Therefore, culinary MSMEs need to determine production capacity carefully by considering raw material requirements, labor availability, processing time, and expected daily demand.

2. *Level Needs Raw Material*

   Raw materials are the primary ingredient in the production process. Adequate availability of raw materials is essential to ensure smooth production (Jacobs & Chase, 2018). In other words, raw materials are the basic ingredients or materials needed to be processed into finished products during production activities. Furthermore, the level of raw material demand can be influenced by several factors, such as market demand, production process efficiency, and inventory policies.

3. *Control Supply*

   Inventory control is the process of managing the stock of goods or materials used in business operations. Inventory encompasses everything from raw materials to finished goods ready for sale to customers. According to Assauri (2008:176), inventory control is the sequence of production activities in accordance with planned quantities, timing, quality, and costs, all of which are interrelated.

   So, it can be concluded that inventory control is a series of control policies to determine the level of inventory that must be maintained, so that we know when to replenish inventory and when to place additional orders. The main goal of inventory control is to maintain a balance between optimal inventory levels and associated costs.

4. *Forecasting*

   Forecasting is the process of estimating or predicting future events or values based on historical data and trend analysis. However, in production activities, forecasting is carried out to determine the demand for a product and is the initial step in the production planning and control process.

According to Heizer and Render (2014), forecasting plays an important role in operations management because it helps businesses estimate future demand and determine the production capacity needed to meet that demand. In the context of culinary MSMEs, forecasting can be used to estimate raw material requirements, labor needs, and daily production capacity so that production activities can be planned more efficiently. Heizer and Render (2014) classify forecasting become term short , medium , and long . Term short involving power Work And scheduling , term medium involving sales and budget , while term long involving location facilities and development product

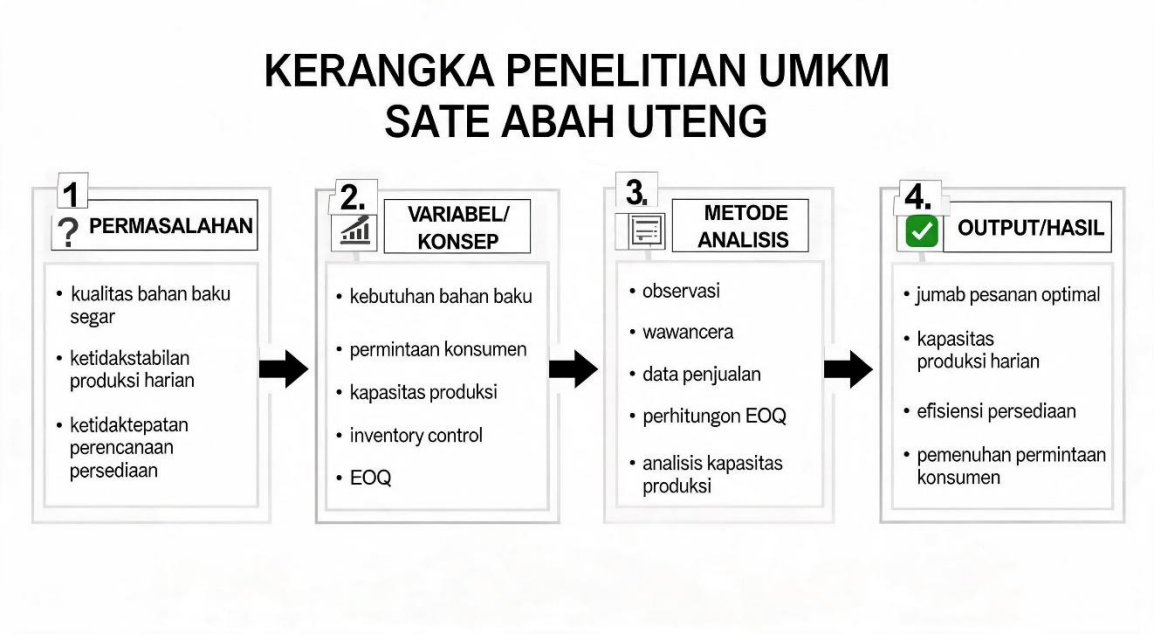
1.3 Kerangka Penelitian

The research framework begins with the operational problems faced by UMKM Sate Abah Uteng, namely the quality of fresh raw materials, unstable daily production, and weak inventory planning. These problems create a need for a more systematic approach to ensure that production activities can run smoothly and consumer demand can be fulfilled.

The framework then focuses on several key concepts, including raw material requirements, consumer demand, production capacity, inventory control, and the Economic Order Quantity (EOQ) method. These concepts are linked because raw material availability directly influences production continuity, while inventory control helps determine the right quantity and timing of material orders.

In the analysis stage, the study uses observation, interviews, sales data, EOQ calculations, and production capacity analysis. Observation and interviews are used to identify operational conditions in the business, while sales data provide the basis for estimating demand patterns and raw material usage.

The final output of the framework is the determination of optimal order quantities, daily production capacity, inventory efficiency, and improved fulfillment of consumer demand. Through this framework, the study is expected to provide a practical and measurable basis for raw material planning and production management in the business.



Gambar 1. Model Penelitian

2. METODOLOGI PENELITIAN

2.1 Metodologi

The inventory control analysis in this study was conducted using the Economic Order Quantity (EOQ) method. EOQ was chosen because it is widely used in operations management to determine the optimal order quantity that minimizes total inventory costs. This method is relevant for MSME Sate Bah Uteng because the business needs to manage perishable raw materials efficiently while avoiding both stock shortages and excessive inventory. The EOQ calculation requires three main variables: raw material demand (D), ordering cost per order (S), and holding cost per unit per period (H). Raw material demand was measured based on the quantity of materials used for production within a specific period. Ordering cost was identified from procurement-related expenses, such as transportation, communication, and purchasing administration costs. Holding cost was estimated from storage-related costs, including storage space, handling, and potential quality deterioration of raw materials. According to Wiratna Sujarweni (2015), Economic Order Quantity (EOQ) is the amount of inventory that must be ordered at one time with objective For Reduce cost annual.

Formula EOQ is EOQ = $\sqrt{(2DS/H}$.

Where:

D = raw material demand during a certain period

S = ordering cost per order

H = holding cost per unit per period

3. HASIL PENELITIAN DAN DISKUSI

Amount need material standard per day

Material satay meat	Capacity	Price
Meat	6 kg	Rp. 550,000
Soy sauce	600 ml	Rp. 18,000
Chilli	¼ kg	Rp. 10,000
Cucumber And carrot	1 kg	Rp. 8,000
Onion red	¼ kg	Rp. 7,000
Brown sugar	¼ kg	Rp. 6,000
Sour Java	1 ounce	Rp. 2,000
vinegar	300 ml	Rp. 4,000
total		**Rp 605,000**

Daily Production Capacity of MSME Sate Bah Uteng

Amount Production per Day (skewer)	Amount Worker
200 - 300	1- 2
400 - 500	2- 3

Data sale per 6 month

Sale						
Per week	September	October	November	December	January	February
Sunday 1	105	110	122	100	120	110
Sunday 2	150	115	110	150	123	135
Sunday 3	125	130	100	109	131	127
Sunday 4	140	125	124	145	125	157

Data Income

Income						
Per week	September	October	November	December	January	February
Sunday 1	2,100,000	2,200,000	2,440,000	2,000,000	2,400,000	2,200,000
Sunday 2	3,000,000	2,300,000	2,200,000	3,000,000	2,460,000	2,700,000
Sunday 3	2,500,000	2,600,000	2,000,000	2,180,000	2,620,000	2,540,000
Sunday 4	2,800,000	2,500,000	2,480,000	2,900,000	2,500,000	3,140,000

Data sale 1 Sunday to behind

Sale	
One Sunday	February/ portion
Day to 1	25
Day to 2	22
Day to 3	10
Day to 4	20
Day to 5	27
Day to 6	23
Day to 7	30

Data Income 1 Sunday To Behind

Income		
One Sunday	February/portion	Amount
Day to 1	25	500,000
Day to 2	22	440,000
Day to 3	10	200,000
Day to 4	20	400,000
Day to 5	27	540,000
Day to 6	23	460,000
Day to 7	30	600,000

Price per portion Rp. 20,000 Price One sweker Rp. 2000

Inventory minimum And maximum

Type satay	Inventory minimum (portion)	Maximum (portion)
Maranggi satay cow	15	20

D = annual raw material requirement
S = ordering cost per order = IDR 10,000
H = holding cost per unit per year = 10% of the unit price
Working period = 364 days per year

To calculate the Economic Order Quantity (EOQ) for raw materials needed in satay production, it is necessary to determine the EOQ for each raw material available. The EOQ is the optimal quantity of raw material to order at each time to minimize total inventory costs. The EOQ formula is:

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

1. Meat:

$$D = 6\,\text{kg/day} \times 364 = 2.184\,\text{kg/year}$$

H= 10%×91,667 = 9,167

$$EOQ = \sqrt{\frac{2\,(2.184)(10.000)}{9.167}}$$

$$EOQ = \sqrt{\frac{43.680.000}{9.167}}$$

$$EOQ = \sqrt{4.764,92}$$

$$EOQ = 69,03\ \text{kg}$$

2. Soy sauce:

$$D = 600\,\text{ml/day} \times 364 = 218.400\,\text{ml/year}$$

H= 10%×30 = 3

$$EOQ = \sqrt{\frac{2\,(218.400)(10.000)}{3}}$$

$$EOQ = \sqrt{\frac{4.368.000.000}{3}}$$

$$EOQ = \sqrt{1.456.000.000}$$

$$EOQ = 38.157{,}57 \text{ ml} / 38{,}16 \text{ liter}$$

3. Chili :

$$D = 0{,}25 \text{ kg /day} \times 364 = 91 \text{ kg/year}$$

H= 10%×40.000 = 4.000

$$EOQ = \sqrt{\frac{2\ (91)(10.000)}{4.000}}$$

$$EOQ = \sqrt{\frac{1.820.000}{4.000}}$$

$$EOQ = \sqrt{455}$$

$$EOQ = 21{,}33 \text{ kg}$$

4. Cucumber and carrot :

$$D = 0.5 \text{ kg/day x } 364 = 184 \text{ kg/ year}$$

H= 10%×40.000 = 4.000

$$EOQ = \sqrt{\frac{2\ (182)(10.000)}{8.00}}$$

$$EOQ = \sqrt{\frac{3.640.000}{800}}$$

$$EOQ = \sqrt{4.550}$$

$$EOQ = 67{,}45 \text{ kg}$$

5. Red Onion :

$$D = 0.5 \text{ kg/day x } 364 = 184 \text{ kg/ year}$$

H= 10%×28.000 = 2.800

$$EOQ = \sqrt{\frac{2\,(91)(10.000)}{2.800}}$$

$$EOQ = \sqrt{\frac{1.820.000}{2.800}}$$

$$EOQ = \sqrt{650}$$

$$EOQ = 25{,}50 \text{ kg}$$

4. KESIMPULAN

4.1 Kesimpulan

Based on the Economic Order Quantity (EOQ) calculation, the raw material ordering needs of MSME Sate Bah Uteng can be determined more systematically by considering annual demand, ordering cost, and holding cost. Using the assumptions of an ordering cost of IDR 10,000 per order**,** a holding cost of 10% of the unit price per year**,** and a working period of 364 days per year**,** the EOQ results show that the optimal order quantities are 69.03 kg of meat**,** 38.16 liters of soy sauce**,** 21.33 kg of chili**,** 67.45 kg of cucumber**,** 67.45 kg of carrot and 25.50 kg of shallots.

These results indicate that the EOQ method can be used as an initial basis for determining economical raw material order quantities. This calculation helps the business avoid two major inventory risks: raw material shortages that may disrupt production and excessive inventory that may cause waste, particularly because most satay raw materials are perishable.

However, the EOQ results should be interpreted carefully because the calculation is based on assumed ordering and holding costs. Therefore, MSME Sate Bah Uteng is advised to record inventory-related costs more accurately, including transportation, communication, purchasing, storage, and quality deterioration costs. More accurate cost data will allow future EOQ calculations to produce more realistic and valid raw material ordering decisions that are better aligned with the actual operational conditions of the business.

4.2 Implikasi/Batasan dan Saran untuk Penelitian Selanjutnya

This study is limited to the operational management aspect of calculating production capacity based on raw material requirements at one culinary MSME in Purwakarta Regency. The first limitation is the relatively short observation period, which may not capture seasonal demand fluctuations or long-term changes in consumer demand. Second, the study only examines one business unit, namely Sate Bah Uteng, so the findings cannot be generalized to all culinary MSMEs. Third, the EOQ calculation is based on assumed ordering and holding costs, which

may not fully represent the actual cost structure of the business. Fourth, this study does not yet include formal demand forecasting, so the production capacity calculation is based on historical and observed data rather than future demand projections. Therefore, future research should use a longer observation period, include more MSME samples, apply actual inventory cost data, and integrate forecasting methods to improve the accuracy of production capacity planning.

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