



LAPORAN PENELITIAN

*Material Planning and Inventory Control in the Nutrition Service Unit at
Ummi Hospital Bogor*

Oleh:

Ketua : Maya Andini Kartikasari, SP, MM
Anggota :

**PENELITIAN INI DILAKSANAKAN ATAS BIAYA ANGGARAN
PENDAPATAN DAN BELANJA STIE GICI TAHUN AKADEMIK
2023/2024. NOMOR KONTRAK: 279/LPPM-GBS/I/2024**

**PROGRAM STUDI MANAJEMEN
SEKOLAH TINGGI ILMU EKONOMI "GICI"
2024**

SURAT PERJANJIAN KONTRAK PENELITIAN Nomor : 279/LPPM-GBS/I/2024

Pada hari ini, Senin, tanggal Delapan bulan Januari tahun Dua Ribu Dua Puluh Empat (08-01-2024), kami yang bertanda tangan di bawah ini:

- 1) Herman Susilo, SE, MM.
Selaku Ketua LPPM STIE “GICI” untuk Program Pasca Sarjana Sekolah Tinggi Ilmu Ekonomi “GICI”, selanjutnya disebut **PIHAK PERTAMA**;
- 2) Maya Andini Kartikasari, SP, MM
Selaku Peneliti, selanjutnya disebut **PIHAK KEDUA**; menyatakan bersepakat untuk membuat perjanjian kontrak penelitian sebagai berikut.

Pasal 1 JUDUL PENELITIAN

PIHAK PERTAMA dalam jabatannya tersebut di atas, memberikan tugas kepada **PIHAK KEDUA** untuk melaksanakan penelitian yang berjudul: “*Material Planning and Inventory Control in the Nutrition Service Unit at Ummi Hospital Bogor*”

Pasal 2 WAKTU DAN BIAYA PENELITIAN

- 1) Waktu penelitian adalah 6 bulan, dari 08 Januari sampai dengan 17 Juni 2024.
- 2) Biaya pelaksanaan penelitian ini dibebankan pada pos Anggaran Pendapatan dan Belanja (APB) Jurusan Peneliti bersangkutan tahun 2023/2024 dengan nilai kontrak sebesar **Rp. 2.000.000 (Dua Juta Rupiah)**.

Pasal 3 PERSONALIA PENELITIAN

Susunan personalia penelitian ini sebagai berikut :

Ketua : Maya Andini Kartikasari, SP, MM
Anggota :

Pasal 4 CARA PEMBAYARAN

Pembayaran biaya penelitian diberikan sesuai dengan aturan dan tata cara yang telah ditetapkan dalam Pedoman Penelitian STIE “GICI”, yaitu:

- 1) Tahap I sebesar 70% dari nilai kontrak yang diterimakan paling cepat dua minggu setelah surat perjanjian kontrak penelitian ini ditandatangani oleh kedua belah pihak melalui Bendahara STIE “GICI”.
- 2) Tahap II sebesar 30% dari nilai kontrak yang diterimakan setelah **PIHAK KEDUA** menyelesaikan seluruh kewajiban pekerjaan penelitian

Pasal 5

KEASLIAN PENELITIAN DAN KEBEBAS-IKATAN DENGAN PIHAK LAIN

- 1) **PIHAK KEDUA** bertanggung jawab atas keaslian judul penelitian sebagaimana disebutkan dalam pasal 1 Surat Perjanjian Kontrak Penelitian ini (bukan duplikat/jiplakan/plagiat) dari penelitian orang lain.
- 2) **PIHAK KEDUA** menjamin bahwa judul penelitian tersebut bebas dari ikatan dengan pihak lain atau tidak sedang didanai oleh pihak lain.
- 3) **PIHAK KEDUA** menjamin bahwa judul penelitian tersebut bukan merupakan penelitian yang SEDANG ATAU SUDAH selesai dikerjakan, baik didanai oleh pihak lain maupun oleh sendiri.
- 4) Apabila di kemudian hari diketahui ketidak benaran pernyataan ini, maka kontrak penelitian dinyatakan batal, dan **PIHAK KEDUA** wajib mengembalikan dana yang telah diterima.

PASAL 6

PEMBIMBING/KONSULTAN PENELITIAN LATIHAN

- 1) Setiap Peneliti Latihan harus menunjuk seorang Pembimbing/Konsultan yang bertugas membimbing pelaksanaan penelitiannya.
- 2) Peneliti Latihan diharuskan berkonsultasi dengan pembimbingnya berkaitan dengan penelitian yang akan dilaksanakan serta laporan hasil penelitiannya.
- 3) *Honorarium* Pembimbing/Konsultan (untuk peneliti dari mahasiswa) ditanggung oleh institusi STIE “GICI” di luar nilai kontrak penelitian sesuai ketentuan yang berlaku, dan akan dibayarkan setelah laporan hasil penelitian beserta kelengkapannya diserahkan ke LPPM melalui Bendahara STIE “GICI”.

Pasal 7

MONITORING PENELITIAN

- (1) **PIHAK PERTAMA** berhak untuk:
 - a) Melakukan pengawasan administrasi, monitoring, dan evaluasi terhadap pelaksanaan penelitian.
 - b) Memberikan sanksi jika dalam pelaksanaan penelitian terjadi pelanggaran terhadap isi perjanjian oleh Peneliti.
 - c) Bentuk sanksi disesuaikan dengan tingkat pelanggaran yang dilakukan.
- (2) Pemantauan kemajuan penelitian dilakukan oleh **PIHAK PERTAMA** bersama dengan *Reviewer*, dan Pembimbing Penelitian untuk Penelitian Latihan.
- (3) **PIHAK KEDUA** diharuskan membuat dan menyampaikan Laporan Kemajuan atas pelaksanaan penelitiannya kepada **PIHAK PERTAMA** sebanyak 2 (dua) eksemplar.
- (4) Pelaksanaan kemajuan penelitian dijadwalkan pada bulan ke-3 setelah Kontrak Penelitian ditanda tangani (Maret 2024).
- (5) Format Laporan Kemajuan dan Teknis pelaksanaannya akan diatur kemudian.

Pasal 8

LAPORAN SEMENTARA DAN SEMINAR HASIL PENELITIAN

- 1) **PIHAK KEDUA** wajib menyerahkan laporan hasil penelitian sementara kepada **PIHAK PERTAMA** paling lambat pada 24 Juni 2024 sebanyak 2 (dua) eksemplar.
- 2) Laporan sementara itu digunakan sebagai bahan seminar hasil penelitian yang penyelenggaraannya menjadi tanggung jawab **PIHAK PERTAMA**.
- 3) Ketua Peneliti diwajibkan hadir untuk mempresentasikan hasil penelitiannya pada seminar hasil penelitian.
- 4) Pelaksanaan teknis seminar hasil penelitian akan diatur tersendiri oleh **PIHAK PERTAMA**.

Pasal 9
LAPORAN AKHIR PENELITIAN

- 1) Setelah seminar hasil penelitian sebagaimana dimaksud pada pasal 8 Perjanjian ini, **PIHAK KEDUA** wajib menyerahkan revisi laporan penelitiannya dalam waktu paling lambat dua minggu.
- 2) Revisi laporan penelitian yang sudah diseminarkan harus mendapat pengesahan dari *reviewer* dan dijilid dalam satu kesatuan dengan laporan.
- 3) Berkas-berkas laporan meliputi:
 - (a) Laporan lengkap penelitian terdiri dari: (A) Laporan Hasil Penelitian, (B) Naskah Publikasi, dan (C) Sinopsis Penelitian Lanjutan (jika ada kelanjutan).
 - (b) Laporan akhir penelitian rangkap 4 (empat) dengan perincian 1 eks. Untuk LPPM, 1 eks. Untuk Perpustakaan STIE “GICI”, 1 eks. Untuk Jurusan.
 - (c) Naskah publikasi dalam bentuk *feature* sebanyak 2 eksemplar yang terpisah dari laporan akhir hasil penelitian. Naskah *feature* (dalam bentuk *hardcopy* dan *softcopy*) ini disiapkan untuk publikasi di media massa.
 - (d) Disket atau CD berisi *file* laporan lengkap dan naskah publikasi bentuk *feature* sebanyak 1 keping.
- 4) Format laporan hasil penelitian sesuai dengan aturan-aturan yang berlaku dan telah ditetapkan dalam Pedoman Penelitian STIE “GICI” dan suplemen ralatnya baik dalam hal warna sampul, tata tulis maupun urutan masing-masing komponen.
- 5) Pada sampul bagian tengah dituliskan nama Peneliti atau Tim Peneliti lengkap dengan gelar masing-masing, sedangkan pada bagian bawah dari laporan tersebut harus dituliskan pernyataan yang berbunyi:

**PENELITIAN INI DILAKSANAKAN ATAS BIAYA
ANGGARAN PENDAPATAN DAN BELANJA STIE “GICI”
TAHUN AKADEMIK 2023/2024
Nomor Kontrak : 279/LPPM-GBS/I/2024**

Pasal 10
HAK KEPEMILIKAN ATAS BARANG/PERALATAN PENELITIAN

Segala barang atau alat yang dibeli atas biaya penelitian menjadi milik Jurusan Peneliti yang bersangkutan. Pengaturan kepemilikannya sebagai berikut :

- 1) Barang atau alat berupa *catridge*, *printer*, alat perekam, akses internet, dan sejenisnya selama masih dapat menggunakan fasilitas STIE “GICI” pada dasarnya tidak dianggarkan dalam biaya penelitian.
- 2) Kamera, alat perekam, dan semacamnya yang dapat dipakai ulang, Buku, Jurnal, CD, VCD, DVD, *cassete*, dan sejenisnya yang merupakan *software*, program, alat atau referensi penelitian yang didapatkan (dibeli) dari anggaran penelitian menjadi milik Jurusan Peneliti.
- 3) Pemindehan hak kepemilikan barang atau alat sebagaimana tersebut dilakukan melalui **PIHAK PERTAMA**.

Pasal 11
INSTITUSIONAL FEE

Dalam rangka penyeragaman dan efisiensi administrasi pelaporan penelitian, **PIHAK PERTAMA** melakukan pemotongan terhadap dana penelitian yang telah disetujui sebesar 5% dengan alokasi pemanfaatan antara lain untuk :

- 1) Penggandaan laporan akhir penelitian sebanyak 4 eksemplar.
- 2) Kegiatan penunjang penelitian bagi dosen/pengusul penelitian.

Pasal 12
SANKSI

Segala kelalaian baik disengaja maupun tidak, sehingga menyebabkan keterlambatan menyerahkan laporan hasil penelitian dengan batas waktu yang telah ditentukan sebagaimana dimaksud dalam pasal 8 Perjanjian ini akan mendapatkan sanksi sebagai berikut :

- 1) Diberhentikannya bantuan keuangan, dan **PIHAK KEDUA** diwajibkan mengembalikan dana yang sudah diterima kepada STIE “GICI” melalui **PIHAK PERTAMA**, atau
- 2) tidak diperbolehkan mengajukan usulan penelitian pada periode tahun anggaran tersebut bagi Ketua dan Anggota Peneliti.

Pasal 13
PENUTUP

Perjanjian ini berlaku sejak ditanda tangani dan disetujui oleh **PIHAK PERTAMA** dan **PIHAK KEDUA**.

Depok, 08 Januari 2024,

PIHAK PERTAMA,



Herman Susilo, SE, MM

Ketua LPPM

PIHAK KEDUA,

Maya Andini Kartikasari, SP, MM

Peneliti

**HALAMAN PENGESAHAN
PENELITIAN DOSEN STIE “GICI”**

Judul Penelitian : Material Planning and Inventory Control in the Nutrition Service Unit at Ummi Hospital Bogor

Ketua Peneliti

- a. Nama Lengkap : Maya Andini Kartikasari, SP, MM
b. Jenis Kelamin : Perempuan
c. NIDN : 0422068302
d. Jabatan Fungsional : Lektor
e. Jurusan : Manajemen
f. Nomor Handphone : 081385176069
g. Alamat E-mail : maya.said2001@gmail.com

Anggota Tim

- a. Nama Anggota 1/Jurusan :
b. Nama Anggota 2/Jurusan :

Lokasi Penelitian :

Alamat :

Lama Penelitian : 6 (Enam) Bulan

Biaya yang diperlukan : Rp. 2.000.000

Sumber Pendanaan : LPPM GICI

Sumber Lain :

Depok, 17 Juni 2024

Mengetahui:
Ketua Jurusan,

Ketua Peneliti

Drs. Henky Hendrawan, MM, M.Si

NIDN: 0416076506

Maya Andini Kartikasari, SP, MM

NIDN: 0422068302

Menyetujui,
Ketua LPPM STIE GICI


LPPM
GICI BUSINESS SCHOOL
SEKOLAH TINGGI ILMU EKONOMI

Herman Susilo, SE, MM

NIDN: 0401128604

ABSTRAK

Judul Penelitian : Perencanaan Material dan Pengendalian Persediaan di Unit Layanan Gizi RS Ummi Bogor

Ketua Peneliti : Maya Andini Kartikasari, SP, MM

Anggota :

Kata Kunci : EOQ; Manajemen Inventaris; Perencanaan Material;

Manajemen inventaris adalah komponen penting dari manajemen rantai pasokan yang melibatkan perencanaan, pengendalian, dan pengawasan tingkat persediaan untuk memastikan ketersediaan bahan sekaligus meminimalkan biaya. Manajemen inventaris yang tepat memastikan bahwa persediaan makanan penting selalu tersedia, memungkinkan rumah sakit menyediakan pilihan makanan yang konsisten dan bervariasi yang disesuaikan dengan kebutuhan pasien. Manajemen inventaris yang efektif juga memastikan bahwa tidak ada gangguan dalam layanan makanan karena kehabisan stok dan menghindari masalah modal dan penyimpanan yang terkait dengan kelebihan stok. Penelitian ini bertujuan untuk memberikan solusi kepada rumah sakit dalam hal perencanaan dan pengendalian bahan untuk tahun anggaran 2024 sehingga rumah sakit dapat meningkatkan dari segi pengelolaan persediaan. Model Kuantitas Pesanan Ekonomi digunakan untuk menentukan jumlah pesanan optimal yang akan dilakukan untuk mempertahankan persediaan pada tingkat tertentu sambil mengoptimalkan biaya persediaan. Hasil penelitian menunjukkan, jumlah pemesanan daging ayam yang optimal adalah 41 kg, daging sapi 21 kg, dan beras 112 kg, dan biaya persediaan yang dikeluarkan karena stok adalah Rp. 170.000, Rp. 268.000 dan 191.400, berturut-turut.

ABSTRACT

Judul Penelitian : *Material Planning and Inventory Control in the Nutrition Service Unit at Ummi Hospital Bogor*

Ketua Peneliti : Maya Andini Kartikasari, SP, MM

Anggota :

Kata Kunci : *EOQ; Inventory Management; Material Planning;*

Inventory management is a critical component of supply chain management that involves the planning, controlling, and overseeing of inventory levels to ensure the availability of materials while minimizing costs. Proper inventory management ensures that essential food supplies are always available, allowing the hospital to provide consistent and varied meal options tailored to patient needs. Effective inventory management also ensures that there are no disruptions in meal service due to stockouts and avoids the capital and storage issues related to overstocking. This study aims to provide solutions to hospital in terms of planning and controlling the materials for the 2024 budget year so that hospital can improve in term of inventory management. Economic Order Quantity model is used to determine the optimal number of orders to be made to maintain inventory at a certain level while optimising inventory costs. The result showed, the optimal order quantity for chicken meat is 41 kg, beef is 21 kg, and rice is 112 kg, and the inventory cost incurred due to the stock is Rp. 170,000, Rp. 268,000 and 191,400, consecutively.

BAB I

PENDAHULUAN

1. INTRODUCTION

Inventory management in a hospital environment is critical for several reasons. Effective inventory management ensures that hospitals can provide continuous high-quality care to patients while maintaining operational efficiency and cost control (Irnawati, 2021). One of the hospital support services that needs attention in its inventory is the nutrition service unit. Inventory management in hospital nutrition is critical to ensure that patients receive timely, nutritious, and safe meals. Proper inventory management ensures that essential food supplies are always available, allowing the hospital to provide consistent and varied meal options tailored to patient needs. Effective inventory management also ensures that there are no disruptions in meal service due to stockouts and avoids the capital and storage issues related to overstocking (Chopra & Meindl, 2016). From a financial perspective, by implementing inventory management, hospitals can minimise food wastage by tracking expiry dates and using a FIFO system, ensuring older stock is used first (Kumar & Rajeev, 2016). By maintaining optimal stock levels, hospitals can avoid costs associated with overstocks and emergency purchases at higher prices (Muller, 2020). Therefore, the budgeting and financial planning can be more accurate.

Ummi Hospital Bogor is a type C public hospital located at Jl Empang II No. 2 Bogor which has excellent services for maternal and child health. Ummi Hospital has a fairly high level of patient visits both outpatients and inpatients. The average number of inpatients per day ranges from 100-150 patients. The nutrition service unit is responsible for the fulfilment of food nutrition for patients, doctors and hospital staff. It's activities that starts from menu planning and materials needs, procurement and storage of materials to food distribution. The material planning is the most important stage since it should be based on accurate data such as the number of patients, doctors and staff on duty every day and included in a monthly shopping plan (Assauri, 2019 and Eunike, 2021). At the materials procurement stage, the challenge faced by hospitals is the different delivery times from each supplier. The timing of ordering materials needs to be well organised, so that the stock is always available when needed. The staff often face problems in the availability of material stocks. The amount of stock provided is sometimes insufficient and this results in a higher frequency of material purchases as well as increased the ordering costs. On the other side, the differences of product characteristics require hospital to provide appropriate storage. For example, fresh products such as meats are stored in freezers, vegetables are stored in chillers and spices are stored in dry areas. Therefore, the materials will avoid the risk of damage, contamination and shrinkage during the storage period.

BAB II

TINJAUAN PUSTAKA

The Economic Order Quantity (EOQ) is widely used by researchers to solve problems in inventory management. The EOQ model is used to calculate the optimal quantity of inventory to order that minimizes the total cost of inventory management, including ordering costs (costs associated with placing orders) and holding costs (costs associated with storing inventory) (Vikaliana, 2020). In food chain industries, the EOQ model helped optimize order sizes, balance inventory levels, reduced risk of overstocking and stockouts, reduce storage costs, leading to improved efficiency and reduced food wastage. Therefore, company can be significantly reduced the operational costs and waste in food production (Kumar and Singh, 2020). In the same way, Smith and Johnson (2022) said the effective inventory management practices for fresh produce also significantly improve inventory turnover rates. This results in fresher products for consumers and lower operational costs for company. In food retail industries, Nguyen and Tran (2018) said the EOQ model helped retailers to maintain an optimal balance of stock, ensuring product availability and minimizing spoilage.

Miller and Carter (2019) found the implement of EOQ model has an impact on the inventory cost reducing by 20% and improved service levels. The model facilitated optimal order quantities and timing, resulting in a balanced inventory and reduced risk of overstocking and stockouts. On the other side, Garcia and Lopez (2018) concluded that effective inventory management practices in the food processing industry reduced costs by 15% and improved production efficiency. Techniques such as demand forecasting and just-in-time inventory were key in maintaining optimal inventory levels. A study in retail industry conducted by Green and Brown (2020) showed that effective inventory management practices could reduce food waste in supermarkets by 25%. The use of inventory tracking systems and regular stock audits helped in identifying and managing excess stock. While in dairy industry, applying the EOQ models reduced cost by 30% and minimized spoilage (Srinivasan and Patel, 2019)

Based on the literature review, this research will use the EOQ model to determine the optimal order quantity that can minimise the total cost of inventory, which includes ordering costs and storage costs. In this research, the author will only focus on the main food materials such as rice, chicken meat and beef where the three ingredients have a large component on the menus and hospital often experience inventory shortages. This study aims to provide solutions to hospital in terms of planning and controlling the materials for the 2024 budget year so that hospital can improve in term of inventory management. In the future, hospital can maintain the inventory level that aligns with the demand rate, enhancing turnover rates while avoiding the stockouts or excess inventory.

BAB III

METODOLOGI PENELITIAN

2. METHODOLOGY

This research is a comprehensive case study and uses a quantitative descriptive approach to analyse the problem of inventory management in the nutrition service unit of Ummi Bogor Hospital. Gay, Mills & Airasian (2011) explained quantitative descriptive research is a type of research that aims to describe or analyse phenomena systematically and objectively using quantitative data. This research focuses on describing the characteristics or variables observed in a population or sample, without making conclusions or testing certain hypotheses. The source of data used by the author are primary data and secondary data. Primary data is obtained by interviews the key persons related to inventory control. While secondary data is obtained from company documentations such as projection demand for certain materials, ordering costs, storage costs, price per unit product, average demand per day, and lead time. Descriptive analysis is used in the discussion of EOQ, safety stock, reorder point, maximum inventory quantity and inventory cost. The data collection methods used in this research are interviews and observations.

This research uses the Economic Order Quantity model, an inventory management technique used to determine the optimal number of orders to be made to maintain inventory at a certain level while

$$EOQ = \sqrt{\frac{2 \times D \times S}{H}}$$

optimising inventory costs. EOQ is based on the linkages between storage costs, ordering costs, and demand requirements (Haizer & Render, 2019). The variables are storage costs, annual demand, and ordering costs. The calculation of the order quantity using the EOQ model is calculated by the formula as follows:

Where:

EOQ = optimal order quantity

D = demand per period

S = ordering cost

H = storage cost per unit

The EOQ model will generate the most economical order quantity of each material then the order frequency during a year can also determine. Safety stock also needs to calculated to anticipate demand uncertainty and inventory shortages. The next step is determining reorder point. Reorder point is the inventory level at which a new order should be placed to replenish stock before it falls to a critical low level. It accounts for lead time and average demand during this period, ensuring that new stock arrives before the existing stock is depleted. The variables are lead time, average demand per day and safety stock. Finally, total inventory cost can be generated by adding up the total storage costs and ordering costs.

BAB IV

HASIL PENELITIAN DAN PEMBAHASAN

RESULTS AND DISCUSSION

Results

Material Planning

Planning food materials, especially in a hospital setting, involves a systematic approach to ensure that nutritional needs are met efficiently and cost-effectively while minimizing waste. This process includes demand forecasting, menu planning, procurement, inventory management, and sustainability considerations. For the demand forecasting, management usually reviews the past consumption patterns to identify trends and average usage rates. The officer then will set the plan for a variety of foods to provide balanced nutrition and prevent menu fatigue. After the menu is set, then continued to generate purchase orders based on forecasted needs and menu plans. Currently, there are 5 vendors collaborate with the hospital in supplying food materials. To supply these 3 main food materials, the hospital has contractual agreements with 3 different vendors. Generally, all vendors and sources are coming from local area which results in significantly reduced transport costs.

Table 1. Projected Demand for Chicken Meat, Beef and Rice for Year 2024

Month	Materials		
	Chicken Meat	Beef	Rice
	Kg	Kg	Kg
Jan-24	333	184	863
Feb-24	294	213	575
Mar-24	305	196	978
Apr-24	248	184	748
May-24	207	173	633
Jun-24	345	282	662
Jul-24	426	340	460
Sep-24	69	127	1.035
Oct-24	219	111	690
Nov-24	253	167	805
Dec-24	248	219	805
Total	3.275	2.472	8.668

Cost Components

Ordering Cost

The EOQ model considers several cost components, which can be categorized into three main types: ordering costs, storage costs, and total inventory cost. Ordering cost is incurred when the hospital procures materials. Ordering costs, also known as setup costs, are the expenses incurred every time an order is placed. These costs are fixed per order such as administrative cost, transportation cost and receiving cost. Ordering costs for the three food materials is only comes from administrative cost which is related to communication with vendors (phone call/WhatsApp/email), while transport costs are borne by the relevant vendors. The ordering costs of each material is Rp 1.000

Storage Cost

Storage costs also known as carrying costs, are the expenses associated with storing and maintaining inventory over a period. Storage cost is determined according to the hospital policy, which is 10% of the purchase price of each food materials.

Table 2. Cost Components

Ordering Cost (Rp)		
Chicken Meat	Beef	Rice
1.000	1.000	1.000
Storage Cost Per Unit (Rp)		
Chicken Meat	Beef	Rice
4.000	12.000	1.400

Optimal Order Quantity Using the EOQ Model

The EOQ model allows hospitals to determine the most optimal ordering quantity of materials with a constant demand and lead time. Based on calculations with the EOQ model, the most economical order quantity for each material is as follows:

Table 3. Optimal Order Quantity

Order Quantity (Kg)		
Chicken Meat	Beef	Rice
41	21	112

On the table above, it can be seen the quantity of each material purchased by the hospital every time they place an order of material within one year. With these calculations, the hospital will obtain an economical cost. The amount of optimal order is determined by the total annual demand of each material. Refers to Table 1, rice has a higher quantity order compared to other materials, thus from the EOQ results show the quantity order of rice is also higher, followed by chicken meat in the 2nd place and then beef.

Order Frequency

Order frequency refers to how often orders are placed over a certain period to replenish inventory. It is a critical component of inventory management, as it helps determine the timing and regularity of orders to maintain optimal stock levels. Order frequency is influenced by various factors such as demand rate, lead time, storage costs, and ordering costs. Total order frequency can be calculated by the formula as follows:

$$\text{Order Frequency} = \frac{D}{Q}$$

Where:

D = Number of orders in one year

Q = Optimal quantity per order

Table 4. Order Frequency

Order Frequency (Times)		
Chicken Meat	Beef	Rice
80	118	78

As we can see on the table above, beef has a higher frequency than others, meaning that the storage of beef is shorter. The fresh beef should be procured 118 times in a year or in the other words, the hospital should be reorder in every 3 days while chicken meat and rice is every 5 days.

Total Ordering Cost

Total ordering cost is a key component of the Economic Order Quantity (EOQ) model, which represents the sum of all expenses incurred each time an order is placed for inventory. These costs are typically fixed per order and do not vary with the size of the order. The formula for calculating ordering costs for 1 year is as follows:

$$\text{Ordering Cost} = \frac{D}{Q} S$$

Where:

D = Number of orders in one year

Q = Optimal quantity per order

S = Order cost per order

Table 5. Total Ordering Cost

Total Ordering Cost/Year (Rp)		
Chicken Meat	Beef	Rice
80.000	118.000	78.000

Total Storage Cost

Storage cost, also known as carrying cost or holding cost, refers to the expenses associated with storing inventory over a period of time. These costs are incurred to keep inventory in a warehouse or storage facility and include various elements such as rent, utilities, insurance, and labor. The formula for calculating storage costs for 1 year is as follows:

$$\text{Storage Cost} = \frac{Q}{2} H$$

Where:

Q = Optimal quantity per order

H = Storage cost per unit

Table 6. Total Storage Cost

Total Storage Cost/Year (Rp)		
Chicken Meat	Beef	Rice
82.000	126.000	78.400

Refers to Table 5 & 6, beef consistently has a higher cost both of ordering and storage cost. The more frequent hospital procures the materials, the more ordering cost are incurred. Beef has a higher ordering frequency, so its resulting on high ordering costs. On the other hand, beef also has a higher price compared on two other materials and it's impacted to the higher storage cost.

Safety Stock Calculation

Safety stock is an additional quantity of inventory held in reserve to protect against uncertainties

in demand or supply. It acts as a buffer to prevent stockouts caused by variations in customer demand, delays in supplier deliveries, or inaccuracies in demand forecasting. The primary purpose of safety stock is to ensure that a company can continue to meet customer demand even when unexpected events occur. It helps maintain service levels and avoid potential lost sales, backorders, or disruptions in production.

Based on Ummi Hospital's policy, the amount of safety stock has been determined on the three ingredients, i.e. 2 kg of chicken and meat, and 25 kg of rice. Safety stock costs can be calculated by the formula as follows:

$$\text{Safety Stock Cost} = H \times \text{Safety Stock}$$

Where:

H = storage cost per unit

SS= Amount of safety stock

Table 7. Total Safety Stock Cost

Safety Stock Cost (Rp)		
Chicken Meat	Beef	Rice
8.000	24.000	35.000

Reorder Point

The reorder point (ROP) is the inventory level at which a new order should be placed to replenish stock before it runs out. It ensures that there is enough inventory to meet demand during the lead time, which is the time taken from placing an order to receiving the inventory. The reorder point helps prevent stockouts and ensures continuous availability of products. The reorder point for each type of materials varies depending on how long the lead time of each material is. The reorder point calculation formula is as follows:

1. Material requirement per day:
$$d = \frac{D}{\text{Total of working days in a year}}$$

2. Reorder Point:
$$\text{ROP} = (d \times L) + \text{Safety Stock}$$

Table 8. Reorder Point

Material	Requirement/day (Kg)	Lead Time (Day)	Safety Stock (Kg)	ROP (Kg)

Chicken Meat	9	2	2	20
Beef	7	1	2	9
Rice	24	2	25	73

Total Inventory Costs

Total inventory cost encompasses all the expenses associated with ordering, holding, and managing inventory. It is a comprehensive measure that includes ordering costs, holding costs, and stockout costs. The goal of inventory management is to minimize the total inventory cost while meeting customer demand and maintaining efficient operations. The total cost of inventory can be calculated by the formula as follows:

$$TIC = \left(\frac{Q}{2} \times H\right) + \left(\frac{D}{Q} \times S\right) + \text{Safety Stock Cost}$$

Table 9. Total Inventory Cost

Material	Storage Cost (Rp)	Ordering Cost (Rp)	Safety Stock Cost (Rp)	Total Inventory Cost (Rp)
Chicken Meat	82.000	80.000	8.000	170.000
Beef	126.000	118.000	24.000	268.000
Rice	78.400	78.000	35.000	191.400

Discussion

The EOQ result represents the ideal number of units that should be ordered each time to minimize total costs. It strikes a balance between ordering too frequently, which incurs high ordering costs, and ordering too infrequently, which leads to high holding costs. Rice has a higher quantity order compared to other materials due to it has lower storage cost. In the menu component, rice has the largest composition so that the need for rice is the most compared to other ingredients. Consolidating orders and storing larger quantities can reduce the frequency of deliveries, thereby reducing handling and administration costs associated with receiving and processing multiple smaller orders. Result of this study in line with the theory stated by Bowersox, Closs dan Cooper (2013), by optimizing the order size, EOQ reduces the number of orders placed, thereby lowering the total ordering costs. Larger inventories reduce the risk of stockouts, which can incur significant costs such as expedited shipping or lost sales. Maintaining a higher inventory level can balance the potential costs of shortages against storage costs.

Meanwhile, beef has smaller quantity order due to higher of storage cost compared to others. As storage costs increase, the EOQ decreases. Heizer & Render (2014) said EOQ also balances the order size to ensure inventory levels are not excessively high, which reduces storage costs and risks of obsolescence. This means the optimal order quantity will be smaller to reduce the amount of inventory held and thus lower the storage costs. Higher storage costs lead to more frequent ordering of smaller quantities. This reduces the average inventory level, thereby minimizing the capital tied up in inventory and the risk of depreciation or obsolescence.

BAB V

SIMPULAN DAN SARAN

CONCLUSION

Based on the results of calculations and data processing using the EOQ model on material supplies for the budget year 2024, the optimal order quantity for chicken meat, beef and rice is 41 kg, 21 kg, and 112 kg, consecutively. Total cost of ordering chicken meat is Rp. 80.0000, beef is Rp. 118.000 and rice is Rp. 78.000. Total storage cost of chicken meat is Rp. 82.000, beef is Rp. 126.000 and rice is Rp. 78.400. The frequency of ordering chicken meat is 80 times, beef is 118 times, and rice is 78 times. Safety stock cost of chicken meat is Rp. 8.000, beef is Rp. 24.000 and rice is Rp. 35.000. Total inventory cost of chicken meat is Rp. 170.000, beef is Rp. 268.000 and rice is Rp. 191.400. Reorder point for chicken meat is 20 Kg, beef is 9 Kg, and rice is 73 Kg.

DAFTAR PUSTAKA

REFERENCES

- Assauri, S. (2019). *Manajemen Operasi Produksi*. Depok: PT Rajagrafindo Persada.
- Bowersox, D. J., Closs, D. J., & Cooper, M. B. (2013). *Supply Chain Logistics Management*. McGraw-Hill.
- Chopra, S., & Meindl, P. (2016). *Supply Chain Management: Strategy, Planning, and Operation*. Pearson
- Eunike, A. (2021). *Perencanaan Produksi dan Pengendalian Persediaan*. Malang: UB Press.
- Gay, L. R., Mills, G. E., & Airasian, P. (2011). *Educational Research: Competencies For Analysis and Applications (10th ed.)*. Boston, MA: Pearson.
- Green, D., & Brown, E. (2020). Reducing Food Waste Through Effective Inventory Management. *Journal of Waste Management And Sustainability*, 14(1), 59-72.
- Heizer, J., & Render, B. (2014). *Operations Management: Sustainability and Supply Chain Management*. Pearson.
- _____. (2019). *Operations management (12th ed.)*. Boston, MA: Pearson.
- Irnawati, J. (2021). *Dasar-Dasar Manajemen Keuangan*. Bandung: Media Sains Indonesia.
- Kumar, S., & Rajeev, P. N. (2016). Inventory Management: A Comparative Study. *Journal of Business and Management*.
- Kumar, A., & Singh, J. P. (2020). Inventory Management In Food Production: A Case Study of Efficient Practices. *International Journal of Inventory Management*.
- Miller, J. R., & Carter, M. (2019). Application of The Economic Order Quantity Model In Food Inventory Management. *Journal of Operations And Supply Chain Management*.
- Muller, M. (2020). *Essentials of Inventory Management*. AMACOM.
- Nguyen, H. T., & Tran, Q. T. (2018). Effective Inventory Control Techniques For Food Retailers. *Journal of Retailing and Consumer Services*.
- Smith, A., & Johnson, L. (2022). Inventory Management For Fresh Produce: Balancing Supply and Demand. *Journal of Retail & Distribution Management*.
- Srinivasan, R., & Patel, K. (2019). Inventory Optimization For Dairy Products: A Model-Based Approach. *Journal of Food Engineering*.
- Vikaliana, R. (2020). *Manajemen Persediaan*. Bandung: Media Sains Indonesia..