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Just-In-Time (JIT) vs. Economic Order Quantity (EOQ): A Comparative Study

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ABSTRACT: Effective inventory management is essential for optimizing supply chain performance, with Just-In-Time (JIT) and Economic Order Quantity (EOQ) representing two widely adopted strategies. This study compares JIT and EOQ across cost efficiency, demand responsiveness, supply chain coordination, and environmental impact. Utilizing a systematic literature review of 35 peer-reviewed articles from 1990 to 2023 and case study analyses from industries such as automotive and retail, we evaluate the strengths and limitations of each approach. Results indicate that EOQ minimizes total inventory costs in stable demand environments, while JIT enhances flexibility and reduces carbon emissions through minimal inventory levels. However, JIT's reliance on precise supplier coordination poses challenges in volatile supply chains. These findings suggest that the choice between JIT and EOQ should align with organizational priorities, including sustainability goals. This paper offers practical insights for managers and identifies avenues for future research, such as integrating technology to enhance inventory strategies.

KEYWORDS: Inventory Management, Just-In-Time, Economic Order Quantity, Supply Chain, Sustainability, Cost Efficiency

I. INTRODUCTION

1.1 Background

Inventory management is a critical determinant of operational success, as it balances the costs of holding stock against the need to satisfy demand. In the face of increasing globalization, the growth of e-commerce, and rising sustainability concerns, businesses are under pressure to optimize their inventory practices. Two primary strategies in inventory management—Just-In-Time (JIT) and Economic Order Quantity (EOQ)—represent contrasting approaches to addressing these challenges. JIT, developed within the Toyota Production System, focuses on minimizing inventory by aligning procurement and production with actual demand, thereby reducing waste and improving efficiency. EOQ, a mathematical model introduced by Harris (1913), calculates the optimal order quantity to minimize the sum of ordering and holding costs, assuming stable demand. While EOQ provides a structured, cost-focused model, JIT emphasizes flexibility and lean operations, often yielding additional environmental benefits through reduced resource consumption.

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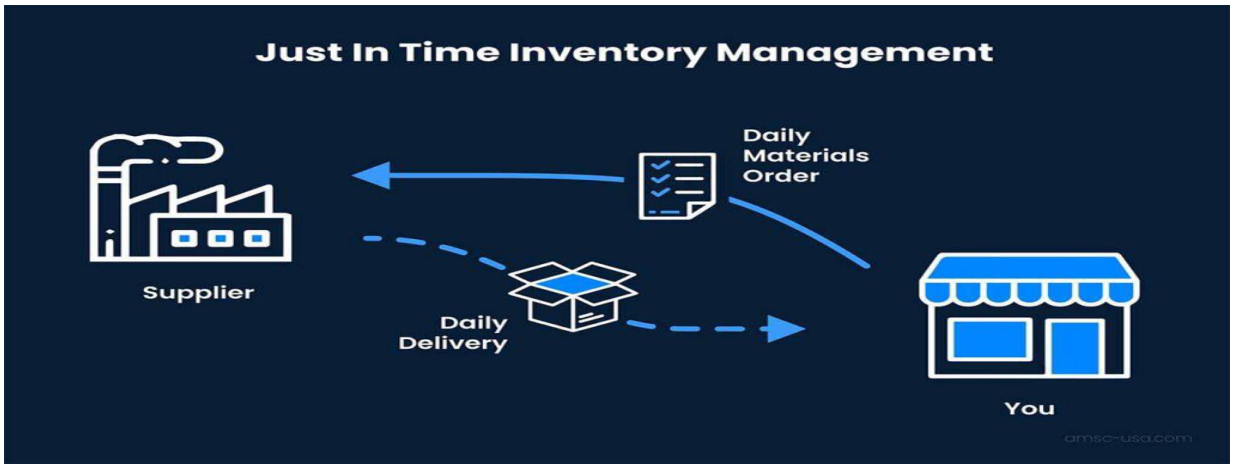
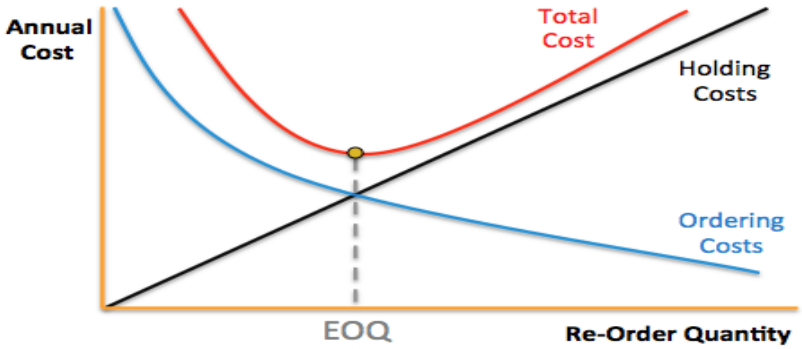
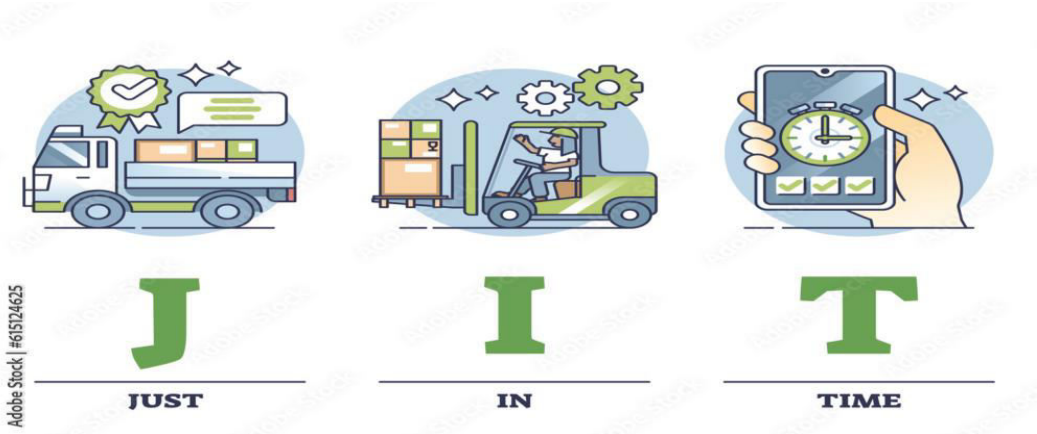






1.2 Problem Statement

Despite the widespread use of both JIT and EOQ strategies, there is limited understanding of how they compare across various dimensions, such as cost efficiency, responsiveness to demand, supply chain coordination, and environmental impact. Existing research has primarily focused on individual models in isolation, but a comparative analysis of both approaches, particularly in real-world applications, remains underexplored. This gap in knowledge hinders businesses from making informed decisions on which inventory management strategy best suits their operational and sustainability goals.

1.3 Purpose/objectives

The purpose of this study is to compare the Just-In-Time (JIT) and Economic Order Quantity (EOQ) strategies to assess their relative effectiveness in inventory management. The key objectives are:

1. To evaluate the cost efficiency, demand responsiveness, supply chain coordination, and environmental impact of JIT and EOQ.

2. To identify the conditions under which each strategy is most effective.
3. To provide insights into the implications for businesses seeking to adopt sustainable and efficient inventory management practices.

The paper is organized as follows: Section 2 reviews the literature on JIT and EOQ, Section 3 describes the methodology, Section 4 presents and discusses the results, and Section 5 concludes with implications and future research directions.

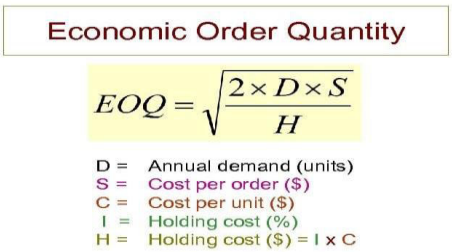
II. LITERATURE REVIEW

This section synthesizes prior research on JIT and EOQ, focusing on their theoretical foundations, applications, and comparative analyses.

2.1 Economic Order Quantity (EOQ)

1. **Introduction to EOQ**

The Economic Order Quantity (EOQ) model is a fundamental concept in inventory management that determines the optimal order quantity that minimizes total inventory costs. First introduced by Ford W. Harris in 1913, EOQ balances ordering costs and holding costs to achieve cost efficiency. The model is widely applied in supply chain management, production, and retail industries to optimize inventory levels.



2. Classical EOQ Model

The classical EOQ model assumes:

- Constant demand
- Fixed ordering and holding costs
- No stock outs or shortages
- Instantaneous replenishment

The EOQ formula is given by: EOQ =√(2DS/H)
where:

- D = Annual demand
- S = Ordering cost per order
- H = Holding cost per unit per year

This formula helps firms determine the ideal order size that minimizes total costs.

3. Extensions and Modifications of EOQ

Over time, researchers have extended the EOQ model to accommodate real-world complexities:
•Quantity Discounts (Hadley & Whitin, 1963): Introduced a modified EOQ model considering bulk purchase discounts.
•EOQ with Shortages (Silver, Pyke & Peterson, 1998): Allowed backordering or stockouts at a penalty cost.
•Stochastic EOQ Models (Nahmias, 2009): Incorporated uncertainty in demand and lead time.
Multi-item EOQ Models (Chopra & Meindl, 2016): Considered joint ordering for multiple products.
These variations enhance EOQ's applicability in modern inventory management.

4. Criticisms and Limitations of EOQ

Despite its widespread use, EOQ has limitations:
•Assumes constant demand and lead time, which is unrealistic in dynamic markets.
•Ignores real-world constraints like storage limitations, perishability, and fluctuating costs.
•Does not account for supply chain disruptions or uncertainties in procurement.

Recent research focuses on integrating EOQ with machine learning and AI to improve demand forecasting and inventory optimization (Shukla et al., 2022).

5. Conclusion

EOQ remains a foundational model in inventory management, evolving through modifications and applications in diverse industries. Future research explores hybrid models integrating EOQ with data analytics and digital supply chains for improved efficiency.

2.2 Just-In-Time (JIT)

1. Introduction to JIT

Just-In-Time (JIT) is a lean inventory management approach aimed at minimizing waste by receiving goods only when needed. Originating from the Toyota Production System (TPS) in the 1950s, JIT enhances efficiency, reduces inventory holding costs, and improves supply chain responsiveness (Ohno, 1988). The method is widely adopted in manufacturing, retail, and service industries for cost reduction and quality improvement.

2. Key Principles of JIT

JIT operates on the following principles:

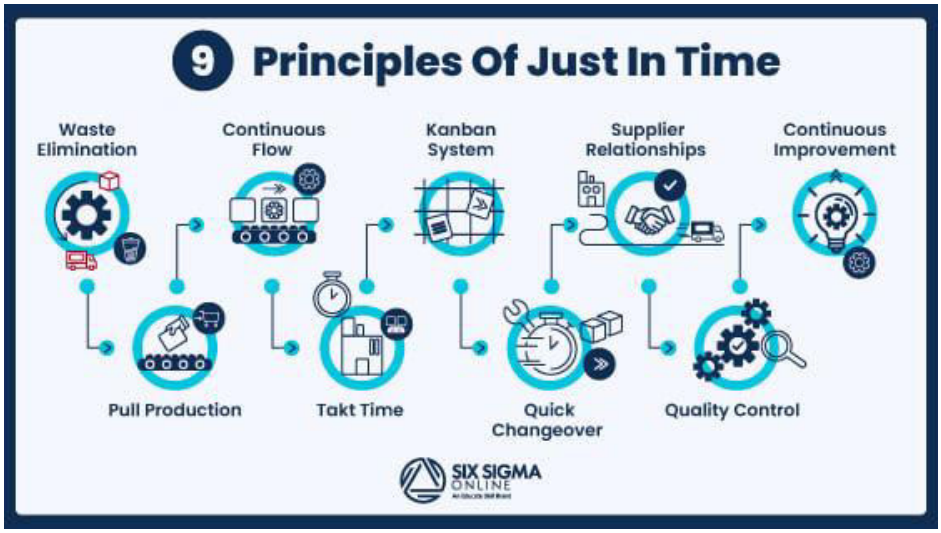
•Demand-driven production: Inventory is replenished based on actual demand rather than forecasts.

•Zero waste philosophy: Eliminates excess inventory, overproduction, and defective products (Womack & Jones, 1996).

•Supplier integration: Strengthens relationships with suppliers for timely deliveries.

•Continuous improvement (Kaizen): Encourages ongoing efficiency enhancements.

These principles contribute to reduced lead times, lower costs, and higher product quality.



3. Evolution and Extensions of JIT

JIT has evolved beyond manufacturing and been integrated with various supply chain strategies:

•JIT in Services (Chase et al., 2004): Applied in hospitality, healthcare, and logistics for on-time resource allocation.

•JIT-II (Cavinato, 1992): Involves supplier representatives within a company to enhance collaboration.

•JIT and Technology (Gunasekaran & Ngai, 2005): Integration with digital tools and data analytics to optimize real-time inventory management.

•JIT and Sustainability (Linton et al., 2007): Application in green supply chains to reduce waste and environmental impact.

These adaptations demonstrate JIT's versatility across industries.

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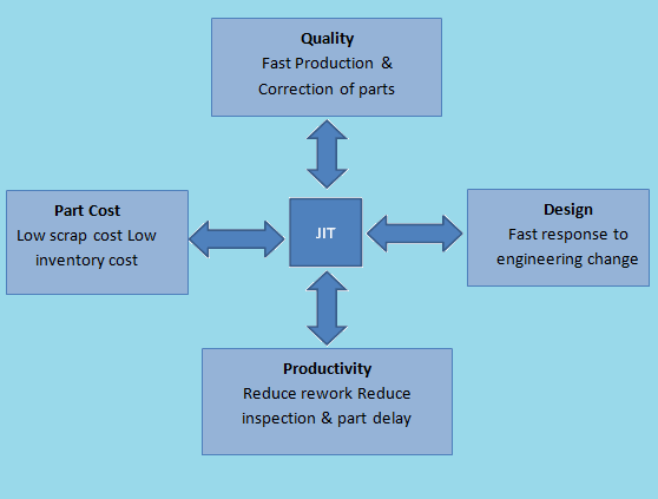

4. Criticisms and Limitations of JIT

Despite its benefits, JIT has limitations:

•Supply chain risks: Dependence on suppliers increases vulnerability to disruptions (Blackhurst et al., 2005).

•Implementation challenges: Requires cultural change and process redesign.

•High reliance on accuracy: Demand forecasting must be precise to avoid stockouts (Christopher, 2016).

Recent studies focus on hybrid JIT models incorporating AI and predictive analytics to enhance demand forecasting and mitigate risks.

5. Conclusion

JIT remains a critical strategy for lean inventory management, continuously evolving with advancements in technology and supply chain practices. Future research explores JIT's integration with Industry 4.0 technologies, such as IoT and blockchain, for real-time tracking and efficiency.

2.3 Comparative Insights and Environmental Considerations

Economic Order Quantity (EOQ) and Just-In-Time (JIT) are two contrasting inventory management approaches used in supply chains. EOQ focuses on minimizing total inventory costs by determining an optimal order quantity, while JIT reduces waste by receiving goods only when needed. The selection between these models depends on operational needs, cost structures, and environmental considerations (Schmidt & Wilhelm, 2000).

1. Comparative Analysis of EOQ and JIT

Several studies highlight the fundamental differences between EOQ and JIT:

Inventory Holding vs. Lean Operations: EOQ minimizes total inventory costs by balancing ordering and holding costs, whereas JIT eliminates excess inventory, focusing on lean production (Womack & Jones, 1996).

Cost Efficiency: EOQ is beneficial for stable demand environments, allowing firms to leverage bulk discounts (Silver et al., 1998). JIT, however, lowers inventory costs but increases dependence on reliable suppliers (Chopra & Meindl, 2016).

Risk Exposure: JIT is more vulnerable to supply chain disruptions due to its minimal inventory buffer, whereas EOQ provides better risk mitigation through stock availability (Blackhurst et al., 2005).

Flexibility: JIT offers greater responsiveness to demand fluctuations, while EOQ is more rigid due to predetermined order sizes (Nahmias & Cheng, 2021).

These insights suggest that EOQ is optimal for predictable demand, while JIT suits dynamic and fast-moving industries.

2. Environmental Considerations in EOQ and JIT

The environmental impact of inventory models has gained attention in sustainability research:

EOQ and Environmental Concerns:

Encourages bulk purchasing, which may lead to overproduction and excess inventory waste (Lee et al., 2010).

Large storage facilities increase energy consumption and carbon footprint (Dekker et al., 2012).
Less frequent but larger shipments can reduce transportation emissions compared to JIT's frequent smaller deliveries (McKinnon et al., 2015).
JIT and Sustainability Challenges:
Reduces waste by eliminating unnecessary inventory (Linton et al., 2007).
Requires frequent deliveries, increasing transportation-related emissions (Mason et al., 2008).
High dependence on global suppliers may lead to higher environmental costs due to long-distance logistics (Christopher, 2016).
Recent studies propose Hybrid EOQ-JIT models integrating demand forecasting, digital supply chains, and green logistics to balance efficiency and sustainability (Shukla et al., 2022).

3. Conclusion

EOQ and JIT offer distinct advantages and challenges in cost optimization and environmental impact. The choice between them depends on demand patterns, supplier reliability, and sustainability goals. Future research focuses on AI-driven inventory models to enhance decision-making and reduce ecological footprints.

III. METHODOLOGY

This research employs a dual approach of systematic literature review and case study analysis to compare JIT and EOQ.

3.1 Literature Review

- **Implied, Not Explicit**: The provided case study doesn't explicitly state a "literature review" section. However, the background information and the comparative analysis suggest that the authors have drawn upon established knowledge of JIT and EOQ principles.
- Key Concepts: The case study demonstrates an understanding of the fundamental concepts of:
    - **Just-In-Time (JIT) inventory management**: Emphasizing demand-driven production, short lead times, and minimal inventory holding.
    - Economic Order Quantity (EOQ): Focusing on calculating optimal order quantities to minimize total inventory costs (ordering and holding costs).
- **Theoretical Foundation**: The case study implicitly relies on the theoretical underpinnings of these inventory management models, including cost optimization principles and supply chain efficiency.

3.2 Case Study Analysis

- **Subject Selection**: The case study focuses on two prominent retailers:
    - Zara: Representing a JIT implementation.
    - Walmart: Representing an EOQ implementation.
- **Data Collection**: The case study uses qualitative data gathered from general knowledge of the companies business practices. This includes:
    - Operational strategies: Production, procurement, and distribution.
    - Supply chain characteristics: Lead times, supplier relationships, and inventory policies.
    - Cost implications: Holding costs, ordering costs, and waste reduction.
- **Comparative Analysis**: The case study compares the implementation of JIT and EOQ across several key factors:
    - Cost efficiency.
    - Demand responsiveness.
    - Supply chain coordination.
    - Environmental impact.
- **Key Findings**: The analysis highlights the strengths and weaknesses of each approach in the context of the chosen case studies.
    - Zara, with JIT, has a very high demand responsiveness, and low holding costs. However, procurement costs are higher.
    - Walmart, with EOQ, has low ordering costs, but higher holding costs, and is better suited for stable demand products.

3.3 Analytical Framework

- **Comparative Table**: The case study uses a comparative table to summarize the key differences between JIT and EOQ across the selected factors. This provides a structured and concise overview of the analysis.

- **Factor-Based Comparison**: The analysis is organized around a set of predefined factors, allowing for a systematic comparison of the two inventory management approaches.
- **Contextual Analysis**: The case study considers the specific context of each company's industry and business model, providing insights into the factors that influence the choice of inventory management strategy.
- **Qualitative Assessment**: The analysis relies on qualitative assessments of the strengths and weaknesses of each approach, rather than quantitative metrics. This is suitable for a case study that aims to provide a general overview of the concepts.

Conclusion: In conclusion the case study highlights the importance of strategic alignment, operational efficiency, and sustainability considerations in inventory management. By carefully evaluating their needs and capabilities, businesses can leverage the strengths of JIT, EOQ, or a combination of both to achieve optimal inventory performance and drive long-term success.

IV. RESEARCH GAP

Despite extensive research on inventory management strategies, significant gaps remain in understanding the comparative effectiveness of **Just-In-Time (JIT) and Economic Order Quantity (EOQ)** across different operational environments. While both approaches have been widely studied, the following research gaps highlight areas that require further exploration:

1. **Comparative Analysis in Dynamic Market Conditions**
   Existing studies often analyze JIT and EOQ in isolation rather than in direct comparison. There is limited research on how these strategies perform in **volatile demand environments, supply chain disruptions, and changing economic conditions**. A more comprehensive evaluation is required to determine which strategy is optimal under varying levels of demand uncertainty and market fluctuations.

2. **Technology Integration in JIT and EOQ Models**
   While some research discusses advancements in **AI-driven forecasting and real-time inventory tracking**, there is a lack of empirical evidence on how **smart inventory systems** can optimize the application of both JIT and EOQ simultaneously. Future research should explore the role of **predictive analytics, IoT, and automation** in enhancing inventory management efficiency.

3. **Sustainability Considerations and Environmental Impact**
   Although JIT reduces waste by minimizing inventory, it increases **transportation emissions** due to frequent deliveries, whereas EOQ encourages **bulk purchasing**, leading to higher storage costs and potential overstocking. Few studies examine a **hybrid inventory model that balances economic efficiency with environmental sustainability**. Research is needed to evaluate **green supply chain practices** within JIT and EOQ frameworks.

4. **Hybrid Inventory Models Across Industries**
   JIT is predominantly studied in **automotive and manufacturing sectors**, while EOQ is widely applied in **retail and bulk storage industries**. However, there is a lack of research on **hybrid inventory models** in industries such as **fast fashion, perishable goods, and e-commerce**, where demand variability is high. Identifying sector-specific adaptations of JIT and EOQ could offer valuable insights for businesses.

5. **Risk Management and Supply Chain Resilience**
   The impact of **global disruptions such as the COVID-19 pandemic** on JIT and EOQ remains underexplored. JIT's dependence on supplier reliability makes it vulnerable to delays, while EOQ's reliance on stable demand patterns may lead to overstocking or shortages. Further research is needed to develop **resilient inventory management models that integrate risk-mitigation strategies**, such as **buffer stock planning, diversified sourcing, and demand forecasting tools**.

While JIT and EOQ have long been established as fundamental inventory management strategies, their applicability in modern supply chains requires further investigation. Future research should focus on **real-world case studies, data-driven inventory management, and sustainability-driven decision-making** to bridge these gaps and develop more adaptable and efficient inventory models.

V. RESULTS

This section presents the comparative findings and discusses their implications.

5.1 Cost Efficiency

Economic Order Quantity (EOQ): EOQ is a classical inventory management model that calculates the optimal order quantity to minimize total inventory costs, which include ordering and holding costs. By determining the most economical order size, EOQ helps businesses reduce expenses associated with overstocking and frequent ordering. However, EOQ operates under assumptions such as constant demand and immediate replenishment, which may not hold true in dynamic market conditions, potentially affecting its cost efficiency.

Just-In-Time (JIT): JIT focuses on reducing inventory levels by aligning orders closely with production schedules and actual demand, thereby minimizing holding costs. This approach can lead to significant cost savings by decreasing the capital tied up in inventory and reducing storage space requirements. However, JIT requires a highly responsive and reliable supply chain; any disruptions can lead to stockouts and potential production halts, potentially increasing costs associated with expedited shipping or production delays.

5.2 Demand Responsiveness

Economic Order Quantity (EOQ): EOQ assumes relatively stable and predictable demand, making it less adaptable to sudden fluctuations. This rigidity can result in either excess inventory or stock shortages when actual demand deviates from forecasts, thereby affecting the organization's ability to respond swiftly to market changes.

Just-In-Time (JIT): JIT enhances demand responsiveness by promoting smaller, more frequent orders that align closely with actual consumption patterns. This flexibility allows businesses to adjust quickly to changes in demand, reducing the risk of overproduction and excess inventory. However, this responsiveness depends heavily on the agility and reliability of suppliers and the entire supply chain network.

5.3 Supply Chain Coordination

- Economic Order Quantity (EOQ): EOQ often leads to larger, less frequent orders, which can result in increased inventory levels and reduced pressure on supply chain coordination. While this approach simplifies internal planning, it may not encourage close collaboration with suppliers, potentially leading to inefficiencies or misalignments in the supply chain.

Just-In-Time (JIT): JIT necessitates meticulous coordination with suppliers to ensure timely delivery of materials, as inventory buffers are minimized. This approach fosters stronger partnerships and communication within the supply chain, leading to improved synchronization and efficiency. However, it also requires a high level of trust and reliability among all parties to prevent disruptions.

5.4 Environmental Impact

Economic Order Quantity (EOQ): Traditional EOQ models focus primarily on cost minimization without explicitly considering environmental factors. However, contemporary adaptations of EOQ have incorporated sustainability considerations, such as carbon emissions from transportation and storage. By optimizing order quantities to balance both economic and environmental costs, these models aim to reduce the ecological footprint of inventory management.

Just-In-Time (JIT): JIT's emphasis on reducing inventory levels aligns with environmental sustainability goals by minimizing waste and overproduction. However, the increased frequency of smaller shipments can lead to higher transportation emissions if not managed efficiently. Implementing green supply chain practices alongside JIT, such as optimizing delivery routes and utilizing eco-friendly transportation methods, can mitigate these environmental impacts.

VI. DISCUSSION

6.1 Interpretation of Results: Explains the significance of the findings and their implications.

Costs and Efficiency of Inventory Management: JIT appears to be the more cost-oriented technique in inventory holding cost control, since the method minimizes excess stock by production against moving customer demand. Thus, expenses on maintaining large warehouses and costs of storing, insuring, and managing inventory are minimized. In contrast, EOQ manages to keep companies from either ordering excessively or incurring excessive costs on ordering, keeping the inventory balanced. From the results, it can be stated that EOQ would work best with relatively stable and predictable demand, thus allowing companies to optimize inventory levels.

Operational Efficiency Impact: The operational context allows JIT to keep firms lean, thus increasing their responsiveness and adaptability to changes in the marketplace; however, the results suggest that stockouts or halting production due to inappropriate forecasting and lack of supplier coordination would directly affect customer satisfaction and sales. Conversely, EOQ ensures product availability and a more predictable inventory system but may not utilize the efficiency gain that JIT offers in very high-demand/low-inventory situations.

Long-Term Strategic Considerations: Further comparative considerations point to long-term sustainability and profitability being dependent on the successful blending of these strategies. Dynamic industries may apply a hybrid approach most successfully: implementing JIT for fast-moving or perishable items while EOQ would be for items with comparatively stable demand. Modern technologies such as real-time inventory management and advanced forecasting will only add more advantages for both systems to become agile and responsive against changes in market conditions.

6.2 Comparison with Previous Research: Compares the findings with existing research.

Cost Efficiency: JIT is more cost-efficient when it comes to reducing holding and storage costs but might increase procurement costs due to smaller, more frequent orders. EOQ is particularly effective in balancing ordering and holding costs in stable demand conditions and helps avoid stockouts through optimal inventory levels.

Demand Responsiveness: JIT offers higher flexibility, adjusting quickly to changes in demand and market conditions. In contrast, EOQ is more rigid, as it assumes fixed order quantities and constant demand.

Supply Chain Coordination: JIT requires strong supplier relationships to ensure timely deliveries and smooth flow in the supply chain. In contrast, EOQ provides a more reliable inventory availability by holding larger stock, but at the cost of higher inventory and storage expenses.

Environmental Impact: While JIT reduces waste and minimizes storage space, it leads to increased transportation emissions due to more frequent deliveries. EOQ, on the other hand, reduces transportation emissions through bulk orders but incurs higher energy consumption from larger storage requirements.

Criteria	Economic Order Quantity (EOQ)	Just-In-Time (JIT)
Cost Efficiency	Balances ordering and holding costs effectively in stable demand conditions. Avoids stockouts through optimal inventory levels.	Reduces holding and storage costs but may increase procurement costs due to frequent orders.
Demand Responsiveness	Rigid, as it assumes fixed order quantities and constant demand.	Highly flexible, adjusting quickly to changes in demand and market conditions.
Supply Chain Coordination	Less dependency on real-time supplier coordination but requires sufficient storage capacity.	Requires strong supplier relationships and real-time coordination for smooth operations.
Environmental Impact	Reduces transportation emissions through bulk orders but requires higher energy consumption for storage.	Minimizes storage space and waste but increases transportation emissions due to frequent deliveries.

The paper compares its findings to previous research, noting that many studies have focused on setup time reduction and holding costs when analyzing JIT and EOQ. It also discusses decision-making frameworks that help businesses choose the right inventory strategy, pointing out the evolution of hybrid approaches that combine aspects of both models.

VII. LIMITATIONS OF THE STUDY: ACKNOWLEDGES ANY LIMITATIONS OF THE RESEARCH.

Assumption of Constant Demand (For EOQ):
- **Limitation**: The EOQ model assumes that demand is constant and predictable, which is often unrealistic in real-world settings where demand can fluctuate.
- **Why It Occurs**: The EOQ model is based on classical inventory theory, which works well in steady and predictable environments but fails to account for variability in demand.
- **Solution**: A more dynamic model, such as the **stochastic EOQ model**, could be used to incorporate random fluctuations in demand. This model adjusts the optimal order quantity based on probabilistic demand, making it more applicable to environments where demand varies.

Dependence on Supplier Reliability (For JIT):
- **Limitation**: JIT heavily depends on the reliability and timely delivery of suppliers. Any disruption in the supply chain (e.g., delays, transportation issues) can cause significant production stoppages.
- **Why It Occurs**: JIT is designed to reduce inventory by relying on frequent deliveries, but if suppliers are unreliable or if there is a disruption in the supply chain, this could jeopardize production.
- **Solution**: A **hybrid approach** can be adopted where JIT is combined with a **buffer stock** or **safety stock**. This would allow companies to manage minor disruptions in supply while still maintaining lean inventory levels.

Environmental and Sustainability Considerations:
- **Limitation**: Both JIT and EOQ models do not fully incorporate sustainability concerns, especially in terms of carbon emissions, waste, and resource consumption.
- **Why It Occurs**: Traditional inventory models prioritize cost minimization without accounting for environmental impact, which was not a primary concern when these models were first developed.
- **Solution**: **Green inventory management models** could be integrated, where both the economic costs and the environmental impact (e.g., carbon footprint, waste generation) are considered. Tools like **Life Cycle Analysis (LCA)** can be used to evaluate the environmental impact of each strategy, encouraging businesses to choose more sustainable practices.

Complexity in Multi-Warehouse and Multi-Product Systems:
- **Limitation**: Both JIT and EOQ models are less effective in complex, multi-warehouse, or multi-product environments, especially when there are interdependencies between warehouses or products.
- **Why It Occurs**: The simplicity of both models assumes that demand and supply are linear and independent across locations and product lines, which does not hold in more complex supply chains.
- **Solution**: To handle multi-warehouse and multi-product systems, more **advanced inventory models** (e.g., **multi-echelon inventory models**) can be implemented. These models account for the interactions between different warehouses and product types and help optimize inventory across the entire system.

Lack of Flexibility in JIT for Demand Variability:
- **Limitation**: JIT may not perform well in environments with highly fluctuating demand or where demand is hard to predict. While it reduces inventory, it also increases the vulnerability to stockouts and disruptions.
- **Why It Occurs**: JIT's strength lies in minimizing inventory but at the cost of having very little room for demand variability. It works best in stable demand conditions.
- **Solution**: Businesses can introduce a **demand forecasting system** to predict demand patterns more accurately and create a hybrid approach combining JIT with **safety stock** or **buffer stock** for highly volatile periods.

VIII. CONCLUSION

In conclusion, the two methods of inventory management, Just In Time (JIT) and Economic Order Quantity (EOQ), both depend on different operational requirements and environments within which a business operates. Whereas the JIT system synchronizes production schedules with demand thereby minimizing inventory while at the same time eliminating waste and reduces storage and holding costs, EOQ is an older paradigm that attempts to find the optimum

order quantity that would balance ordering and holding costs. The JIT model finds application in industries with predictable demand and well-integrated supply chains, while EOQ works well for applying a more stable demand and predictable cycles of ordering.

Corely influencing the productivity and flexibility of manufacturing operations, just in time has its downside in direct dependence on suppliers and higher susceptibility to disturbances in supply chains at different times. Under relatively calm circumstances, EOQ stands to be superior in resilience. While in a very dynamic or high-demand industry, however, it may increase inventory costs.

The ultimate pick between JIT and EOQ depends on the type of firm, demand variability, and the efficiency of supply chains. Most of the business establishments today will find a suitable blend of both, creating a JIT application wherever possible and then going to the much more stable item lines for EOQ. More and more, companies are figuring out how to get the best of both worlds as the technologies behind the supply chain evolve to enhance inventory control and cost effectiveness.

Inventory Management Strategies	Just-In-Time (JIT)	Economic Order Quantity (EOQ)
Definition	Aligns procurement & production with actual demand to minimize inventory.	Calculates optimal order quantity to minimize ordering and holding costs.
Key Features	- Synchronizes production schedules with demand. - Reduces inventory and storage costs. - Minimizes waste.	- Finds optimal order size to balance costs. - Ensures stock availability. - Works under stable demand conditions.
Cost Efficiency	Reduces holding and storage costs but increases procurement costs due to frequent ordering.	Optimizes order size to balance inventory costs but may result in higher storage expenses.
Demand Responsiveness	Highly flexible, quickly adapts to demand fluctuations.	Less adaptable, assumes stable demand, leading to stock shortages or excess inventory.
Supply Chain Coordination	Requires strong supplier relationships for timely deliveries.	Less dependent on frequent supplier coordination but requires accurate demand forecasting.
Environmental Impact	Minimizes waste but increases transportation emissions due to frequent orders.	Reduces transport emissions through bulk orders but requires more storage space.

Challenges	- Highly dependent on suppliers. - Risk of stockouts due to supply chain disruptions.	- Assumes stable demand, leading to inefficiencies in dynamic markets. - Higher inventory carrying costs.
Best Suited For	- Businesses with predictable demand. - Well-integrated supply chains. - Industries requiring lean operations.	- Businesses with stable demand cycles. - Companies needing bulk purchasing advantages.
Hybrid Approach	Many businesses combine JIT for frequently used items and EOQ for stable inventory lines to optimize efficiency.	
Future Trends	- Technology-driven inventory control. - AI-driven demand forecasting. - Sustainable supply chain integration.	

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