3ème Conférence Internationale sur les Sciences Appliquées et l'Innovation (CISAI-2025)
Proceedings Book Series –PBS- Vol 25, 219-220

Strategic Supply Chain Management Using Lot Sizing Models

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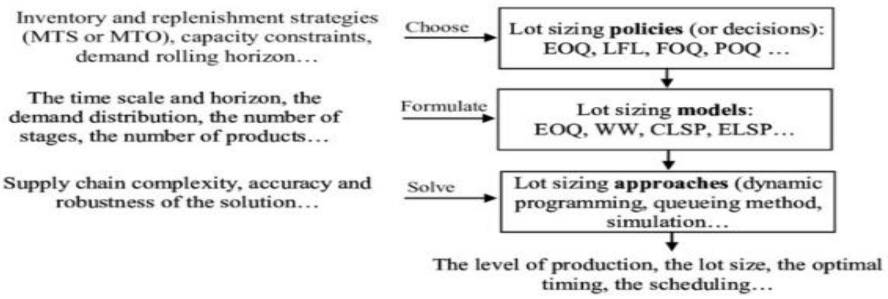
Introduction :

Strategic supply chain planning is crucial for improving material flow and reducing costs in industry. Lot Sizing models optimize production quantities by balancing setup and holding costs. They use mathematical methods and forecasting techniques like Box & Jenkins for accurate data. These models aid effective production and inventory decisions. This study aims to demonstrate the effectiveness of Lot Sizing models in improving production and inventory decisions and to provide a flexible, applicable framework.

Résultats :



- The multi-level Lot Sizing model proposed in this study :

$$Z_{min} = \left[\sum_{i=1}^{N}\sum_{t=1}^{T}\left[CDP_{i_M t}DP_{i_M t} + \sum_{k=1}^{M}\left(Cl_{i_k t}^{s} I_{i_K t}^{s} + \sum_{j=1}^{N(k)} CL_{i_k u_j^{(k)} t} X_{i_k u_j^{(k)} t} + P_{i_k u_j^{(k)} t} Q_{i_k u_j^{(k)} t} + A_{i_k u_j^{(k)} t} Q_{i_k u_j^{(k)} t}\right)\right]\right]$$

$$Z_{max} = \sum_{i=1}^{N}\sum_{t=1}^{T} CDS_{i_M t} DS_{i_M t}$$

$$\sum_{i=1}^{N} Capa_{i_k u_j^{(k)} t} Q_{i_k u_j^{(k)} t} \leq CapaR_{u_j^{(k)} t}$$
$$\forall (k,t) \epsilon [1, M] * [1, T], j \epsilon [1, N(k)]$$

$$Capa_{i_k u_j^{(k)} t} Q_{i_k u_j^{(k)} t} \leq CapaR_{u_j^{(k)} t} X_{i_k u_j^{(k)} t}$$
$$\forall (i,k,t) \epsilon [1, N] * [1, M] * [1, T], j \epsilon [1, N(k)]$$

ISSN: 2961-6611

$$I_{i_M t}^{+} = I_{i_M (t-1)}^{+} + \sum_{j=1}^{N(M)} Q_{i_k u_j^{(k)} t} - DS_{i_M t}$$

$$\forall (i,t) \epsilon [1,N] * [1,T]$$

$$I_{i_K t}^{+} = I_{i_K (t-1)}^{+} + \sum_{j=1}^{N(K)} Q_{i_k u_j^{(k)} t} - \sum_{j=1}^{N(k+1)} Q_{i_{k+1} u_j^{(k+1)} t} {}^{*} Capa_{(i_k, i_{k+1}) u_j^{(k)}, u_j^{(k+1)} t}$$

$$\forall (i,k,t) \epsilon [1,N] * [1,M-1] * [1,T]$$

$$DAp_{l,i,k,t} = \sum_{i=1}^{N} b_{i,l} Q_{i_1 u_j^{(1)} t}$$

$$\forall (l,i,k,t) \epsilon [1,L] * [1,N] * [1,M] * [1,T]$$

$$D_{i_M t} = DP_{i_M t} + DS_{i_M t}$$

$$\forall (i,t) \epsilon [1,N] * [1,T]$$

$$\sum_{j=1}^{N(K)} Q_{i_k u_j^{(k)} (t+1)} \leq I_{i(k-1) t}^{s}$$

$$DS_{i_M t+1} \leq I_{i(M-1) t}^{s}$$

$$I_{i_K t}^{s} = I_{i_K (t-1)}^{+} + \sum_{j=1}^{N(k+1)} Q_{i_k u_j^{(k+1)} t+1}$$

$$I_{i_M t}^{s} = I_{i_M (t-1)}^{+} - DS_{i_M (t+1)}$$

$$I_{i_K t}^{s} = I_{i_K T}^{+}$$

- Commentaires

This study aims to minimize total supply chain costs and maximize overall profit, under constaints related to production volumes, working days, energy capacities (fuel and electrecity), and supply availability

Conclusion :

This study highlights the importance of integrating Lot Sizing models into the strategic management of supply chains to enhance operational efficiency and reduce costs. The adapted model supports effective decision-making under resource constraints. It is recommended for industrial firms aiming to enhance overall performance.

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ISSN: 2961-6611