PENGENDALIAN PERSEDIAAN BAHAN BAKU RESIN DAN KALSIUM MENGGUNAKAN TIGA MODEL *ECONOMIC ORDER QUANTITY* (EOQ) PROBABILISTIK (STUDI KASUS: PT INDONESIA PLAFON SEMESTA)

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INTISARI

Latar Belakang: PT Indonesia Plafon Semesta masih menggunakan kebijakan stok minimum manual dalam pengendalian bahan baku resin dan kalsium. Fluktuasi permintaan dan ketidakpastian *lead time* pemasok menimbulkan risiko *stockout* maupun *overstock* yang meningkatkan biaya persediaan dan berpotensi menghambat produksi.

Tujuan: Penelitian ini bertujuan memodelkan ketidakpastian permintaan dan *lead time* dengan Simulasi Monte Carlo, menentukan jumlah pemesanan optimal (*Economic Order Quantity*), *safety stock* (SS), dan *reorder point* (ROP) menggunakan pendekatan EOQ probabilistik, serta membandingkan *Total Inventory Cost* (TIC) antara kebijakan aktual dan usulan.

Metode: Simulasi Monte Carlo digunakan untuk membentuk distribusi probabilitas permintaan dan *lead time*, kemudian dihitung dengan tiga formulasi EOQ probabilistik. Data meliputi permintaan plafon PVC, konversi bahan baku, *lead time*, biaya pemesanan, biaya penyimpanan, dan biaya kekurangan stok periode Januari – Desember 2024. Akurasi simulasi dievaluasi dengan *Mean Absolute Percentage Error* (MAPE).

Hasil: Perbandingan menunjukkan bahwa untuk kalsium maupun resin, Rumus 1 menghasilkan *service level* sekitar 94–97% dengan biaya relatif lebih tinggi (Rp20,55 juta dan Rp15,47 juta). Rumus 2 memberikan hasil paling efisien karena mencapai *service level* 95% dengan biaya terendah (Rp19,93 juta dan Rp15,03 juta). Sementara itu, Rumus 3 menghasilkan *service level* sekitar 96-97% dengan biaya mendekati Rumus 1 (Rp20,33 juta dan Rp15,20 juta), serta dianggap lebih realistis karena memperhitungkan *shortage*.

Kesimpulan: Berdasarkan hasil tersebut, pemilihan model EOQ probabilistik perlu disesuaikan dengan prioritas perusahaan. Jika perusahaan mengutamakan kemudahan, maka Rumus 1 lebih tepat. Apabila efisiensi biaya yang menjadi fokus, Rumus 2 menjadi pilihan terbaik. Sedangkan Rumus 3 sesuai digunakan apabila perusahaan ingin memperoleh hasil yang lebih realistis terhadap kondisi persediaan di lapangan.

Kata kunci: Pengendalian Persediaan, Model Probabilistik, Simulasi Monte Carlo, EOQ Probabilistik, *Continuous Review System.*

INVENTORY CONTROL OF RESIN AND CALCIUM RAW MATERIALS USING THREE PROBABILISTIC ECONOMIC ORDER QUANTITY (EOQ) MODELS (CASE STUDY: PT INDONESIA PLAFON SEMESTA)

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ABSTRACT

Background: *PT Indonesia Plafon Semesta still applies a manual minimum stock policy in controlling resin and calcium raw materials. Fluctuating demand and uncertain supplier lead times pose risks of stockouts and overstock, which increase inventory costs and potentially disrupt production continuity.*

Objective: *This study aims to model demand and lead time uncertainty using Monte Carlo Simulation, determine the optimal order quantity (Economic Order Quantity), safety stock (SS), and reorder point (ROP) with a probabilistic EOQ approach, and compare the Total Inventory Cost (TIC) between the current and proposed policies.*

Method: *Monte Carlo Simulation was employed to generate probability distributions of demand and lead time, followed by calculations using three probabilistic EOQ formulations. The data include PVC ceiling demand, raw material conversion, supplier lead time, ordering cost, holding cost, and shortage cost from January to December 2024. The accuracy of the demand simulation was evaluated using the MAPE..*

Results: *The comparison shows that for both calcium and resin, Formula 1 yields a service level of around 94–97% with relatively higher costs (Rp20.55 million and Rp15.47 million). Formula 2 is the most efficient, achieving a 95% service level with the lowest costs (Rp19.93 million and Rp15.03 million). Meanwhile, Formula 3 provides a service level of around 96–97% with costs close to Formula 1 (Rp20.33 million and Rp15.20 million), and is considered more realistic as it accounts for shortages.*

Conclusion: *Based on these results, the selection of a probabilistic EOQ model should be adjusted to the company's priorities. If simplicity is the main concern, Formula 1 is more suitable. If the focus is on cost efficiency, Formula 2 is the best choice. Meanwhile, Formula 3 is more appropriate when the company aims for results that better reflect real inventory conditions.*

Keywords: *Inventory Control, Probabilistic Model, Monte Carlo Simulation, Probabilistic EOQ, Continuous Review System.*