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# Rise And Use Of Artificial Intelligence And Machine Learning in Packaging Processes of E-Commerce Giant Amazon Pre and Post Covid

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**Abstract:** *This research studies the revolutionizing impact of Artificial Intelligence (AI) and Machine Learning (ML) on packaging strategies in Amazon's e-commerce supply chain, reviewing trends reported in the company's 2019-2023 sustainability reports. The research indicates a significant transformation in packaging technologies and sustainability initiatives, driven by both internal technological developments and innovation and external factors like the COVID-19 pandemic. Starting in 2019, Amazon used ML algorithms to analyze and consider upon best packaging solutions—favoring lighter, flex mailers ahead of corrugated boxes—which reduced material utilization and carbon outputs throughout its logistics chain. By 2021, data science algorithm integration assisted global deployment at scale, optimizing box sizes across 12 geographies and 65% of shipments, with plans to expand to 97% by 2022. The pandemic period accelerated a movement toward automation and smart design, leveraging computer vision and natural language processing to drive packaging decisions for millions of products with unique shapes. In the post-COVID years (2022–2023), Amazon expanded these technologies to scale, adding AI to review customer feedback, product characteristics, and delivery information to minimize empty space and optimize shipments of multiple items. The result of these initiatives has been a 43% decrease in average packaging weight since 2015, removing more than 3 million metric tons of material. This article emphasizes the way AI-powered sustainability efforts in packaging have developed from focused efficiency initiatives to a complex, globalized system that serves environmental objectives while improving operational flexibility and customer satisfaction..*

**Keywords:** Artificial Intelligence, Machine Learning, Sustainable E-commerce, Smart Packaging Optimization



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