Chapter 5
A Proposal to the Reduction of Carbon Dioxide Emission in Inventory Replenishment: Mitigating the Climate Change

Irma-Delia Rojas-Cuevas, Santiago-Omar Caballero-Morales, Diana Sánchez-Partida, and José-Luis Martínez-Flores

Abstract The climate changes resulting from contaminant emission can be classified as a human-made disaster of type slow-onset. The purpose of this paper is to propose a methodology to mitigate the human-made disaster in the most critical contaminant, Carbon Dioxide (CO_2) emissions. The CO_2 comes from different sources; one of them is vehicles. Vehicles contributed in 2004 with almost 25% of the CO_2 emission. This study proposes a methodology based on a new model to consider the CO_2 emission in calculating economic lot quantity under the continuous revision model (Q, R). In addition, this paper proposes a methodology with a new integrated model to tax the CO_2 emission in inventory planning and proposes the Three-Dimensional Bin Packing Problem. The new model is an extended Q.R. model that uses the metric of CO_2 emission. In the same way, the proposed methodology consists of: first, calculate the shortest path; second calculate the economic lot quantity under the continuous revision model without CO_2, with lowest CO_2, and with maximum CO_2 to obtain a comparative using the new model; and finally obtain the loading in the vehicle improving the space utilization of the bins using fewer vehicles to obtain less CO_2 emission. The new model for taxing CO_2 emission and the proposal of loading must obtain results that permit to decide the best size of economic lot quantity under the continuous revision model. The analysis presented allows choosing the best strategy to stock the inventory under the continuous revision model with CO_2 emission and obtain the best utilization of vehicles to decrease the number of vehicles needed and reduce carbon dioxide emissions to disaster risk reduction in environmental changes.

I.-D. Rojas-Cuevas (✉)
Department of Systems and Computation, TECNM/Instituto Tecnológico de Puebla (TECNM/ITP), Av. Tecnológico No. 420, Colonia Maravillas, Puebla, Puebla 72220, México
e-mail: irma.rojas@puebla.tecnm.mx

S.-O. Caballero-Morales · D. Sánchez-Partida · J.-L. Martínez-Flores
Department of Logistics and Supply Chain Management, Universidad Popular Autónoma del Estado de Puebla (UPAEP University), 17 Sur 901, Barrio de Santiago, Puebla, Puebla 72410, México

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