The rapid growth of online retailing necessitates flexible warehouse management strategies to adapt to this evolving landscape. One of the critical challenges in this area is to reduce the order-picking travel distance. This travel distance is highly affected by the Storage Location Assignment (SLA) decision, which determines how products are allocated to locations in the warehouse. Prevalent SLA strategies are turnover-based assignment, correlated storage assignment, and scattered storage assignment. This study proposes a mixed SLA approach that adopts each prevalent SLA strategy to some degree, tailored to the customer order pattern. To this end, three analytical measures are defined to assess the degree of realization of each SLA strategy. To address the dynamic nature of business needs, a data-driven approach is introduced to calculate the weight of each measure using customer order data. Next, a novel multi-dimensional mathematical model for SLA optimization is proposed. This model incorporates the weighted measures and operational constraints. As the primary goal of SLA optimization is to reduce the order-picking travel distance, the proposed model is tested in a collaborative human-robot order-picking configuration in a mixed-shelves layout. Finally, results indicate that the proposed model provides better storage assignments than when focusing on classical strategies individually.