Development of Internet of Things (IoT) with Mobile Voice Picking and Cargo Tracing Systems in Warehouse Operations of Third-Party Logistics

Authors : Eugene Y. C. Wong

Abstract : The increased market competition, customer expectation, and warehouse operating cost in third-party logistics have motivated the continuous exploration in improving operation efficiency in warehouse logistics. Cargo tracing in ordering picking process consumes excessive time for warehouse operators when handling enormous quantities of goods flowing through the warehouse each day. Internet of Things (IoT) with mobile cargo tracing apps and database management systems are developed this research to facilitate and reduce the cargo tracing time in order picking process of a third-party logistics firm. An operation review is carried out in the firm with opportunities for improvement being identified, including inaccurate inventory record in warehouse management system, excessive tracing time on stored products, and product misdelivery. The facility layout has been improved by modifying the designated locations of various types of products. The relationship among the pick and pack processing time, cargo tracing time, delivery accuracy, inventory turnover, and inventory count operation time in the warehouse are evaluated. The correlation of the factors affecting the overall cycle time is analysed. A mobile app is developed with the use of MIT App Inventor and the Access management database to facilitate cargo tracking anytime anywhere. The information flow framework from warehouse database system to cloud computing document-sharing, and further to the mobile app device is developed. The improved performance on cargo tracing in the order processing cycle time of warehouse operators have been collected and evaluated. The developed mobile voice picking and tracking systems brings significant benefit to the third-party logistics firm, including eliminating unnecessary cargo tracing time in order picking process and reducing warehouse operators overtime cost. The mobile tracking device is further planned to enhance the picking time and cycle count of warehouse operators with voice picking system in the developed mobile apps as future development.