

Analysis of Waiting Time and Drivers Fatigue at Manual Toll Plaza and Suggestion of an Automated Toll Tax Collection System

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Abstract : Toll tax collection is the earliest method of tax collection and revenue generation. This revenue is utilized for the development of roads networks, maintenance, and connecting to roads and highways across the country. Pakistan is one of the biggest countries, covers a wide area of land, roads networks, and motorways are important source of connecting cities. Every day millions of people use motorways, and they have to stop at toll plazas to pay toll tax as majority of toll plazas are manually collecting toll tax. The purpose of this study is to calculate the waiting time of vehicles at Karachi Hyderabad (M-9) motorway. As Karachi is the biggest city of Pakistan and hundreds of thousands of people use this route to approach other cities. Currently, toll tax collection is manual system which is a major cause for long time waiting at toll plaza. This study calculates the waiting time of vehicles, fuel consumed in waiting time, manpower employed at toll plaza as all process is manual, and it also leads to mental and physical fatigue of driver. All wastages of sources are also calculated, and a most feasible automatic toll tax collection system is proposed which is not only beneficial to reduce waiting time but also beneficial in reduction of fuel, reduction of manpower employed, and reduction in physical and mental fatigue. A cost comparison in terms of wastages is also shown between manual and automatic toll tax collection system (E-Z Pass). Results of this study reveal that, if automatic toll collection system is implemented at Karachi to Hyderabad motorway (M-9), there will be a significance reduction in waiting time of vehicles, which leads to reduction of fuel consumption, environmental pollution, mental and physical fatigue of driver. All these reductions are also calculated in terms of money (Pakistani rupees) and it is obtained that millions of rupees can be saved by using automatic toll collection system which will lead to improve the economy of country.

Keywords : toll tax collection, waiting time, wastages, driver fatigue

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