Study of applying the congestion pricing system in central Cairo

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Abstract

In order for the Egyptian ministry of traffic to reduce traffic congestion, it has to apply the congestion pricing system. In difference from other areas around the world, the capital of Egypt stands out with sparse roads infrastructure, more than one business district area and long distances for traveller’s pairs of origins and destinations. The economic costs of Cairo’s congestion amounts to around 4% of the annual GDP, when the travellers start their trips from the origins to the destinations. This study presents an application of the congestion pricing system on of Al Qasr Al Ayni Street, which is one of Cairo’s city centre streets. This thesis presents a mathematical model that is developed in order to reduce traffic congestion of traveller’s trips from the beginning of Al Qasr Al Ayni Street to the end of Al Qasr Al Ayni Street. The model seeks to find the optimal route for the travellers in order to reduce congestion on of Al Qasr Al Ayni Street. The model used to minimize the total monetary costs of fuel and tolls. An essential part of this research has been to establish different types of performance measurements such as Travel Time, Travel Distance, Travel Speed, Travel Demand, Roads Maximum Capacity and Roads Minimum Capacity that are reflected through the mathematical model. The research shows that only focusing on monetary costs such as the consumed fuel and the congestion tolls, it also has an effect on the value of travel time saving (VTTS). In order to obtain a solution to the problem in some instances where the immediate solutions do not help, the congestion pricing system is proposed. The cost-benefit analysis theory has been used to compare the social surplus between the traffic condition on Al Qasr Al Ayni Street before and after the congestion pricing system. Where the social surplus consists of consumer surplus, externalities, government costs and revenues, and tax effects. The social surplus in this study is more than 33860 EGP per day as the author considered the shorter travel time and the cost of fuel. The social surplus has been calculated for the flow per hour, for daily working hours from 7 am to 8 pm. The social surplus in this study is not yet complete as some costs are missed, such as emissions and taxes. Al Qasr Al Ayni congestion percent has been decreased from 27% to around 2%.