# Modelling of traffic flow dynamics for understanding traffic congestion in Tanzania: case of Dar es Salaam City

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Major disruption to a transportation network can disturb traffic flow patterns significantly. To deploy effective and efficient traffic flow restoration situation, a good prediction of the traffic flow dynamics and pattern under network disruption is vital. The main objective of this thesis was to develop a mathematical model for studying traffic flow dynamics to to understand traffic congestion in Tanzania aiming at alleviating traffic congestion. Although traffic flow evolution processes have been modelled in the past, very limited attention has been paid to this agenda after an unexpected network disruption due to the pressure of static bottlenecks on roads. This thesis examines various road networks in Dar es Salaam to identify major static bottlenecks that influence traffic flow dynamics. Data collection made includes traffic flow dynamics. Again, determination of travel time-delay data employing a test mobile car method to quantify the critical traffic points showing high recurrent traffic congestion was done. The roads that indicated to have high frequency of recurrent congestion were studied to obtain traffic flow parameters as inputs of a mathematical model to study the effect of the static bottlenecks on the vehicle flow. It has indicated that recurrent congestion at various critical traffic points were associated with the presence of T-junctions, cross junctions, bus stops, humps and traffic lights. Bagamoyo road that indicated to have a high number of critical traffic points was used as a representative of other road networks. The results indicated that presence of various types of static bottlenecks destroy the stability and uniform traffic flow causing stop-and-go traffic, leading to high traffic flow fluctuations and reduction in traffic system's efficiency. Results further show that properly improved road features can enhance the road network performance and increase traffic system's efficiency. Basing on this results, the developed model can be used to assess the effects of the pressure of static bottlenecks, hence used as a guide for traffic engineers and road planners to improve road design features and enhance the mean vehicle speed and density leading to improved traffic flow stability and effucuency.