Mass Transit System for Bahrain: A Macroscopic Planning and Microscopic Management View

A Thesis Submitted in Partial Fulfillment of the Requirements for the Master Degree in Engineering Management

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Abstract

Mass Transit System is an essential mode of transportation system since it can among many others; accommodate large number of people in lesser overall travel time especially during rush hours. Mass Transit System is becoming more and more pressing issue in the Gulf Countries since vehicle growth rate is high and the public transport ridership is far lesser than any developed countries. As a result, vehicle density on the networks is very high and the congestion is becoming a nightmare. Introducing Mass Transit System is highly feasible from economic, social and environmental point of view than expanding the road network.

Due to the continuous high population and vehicle growth, limitation in space, high demand for mobility, lack of proper public transport system, unacceptabe level of operation of the current public transport system, excessive congestion, long travel time and negative environmental consequences of ever increasing of vehicle fleet, Mass Transit System (MTS) is inevitable for Bahrain. This study introduces the planning and managing needs for various types of Mass Transit System inclusive of bus, tram, metro and light rail transit along with their future expansions.

A conceptual design of a network is proposed based on a macro level of data need. These are based on vehicle trends, population, fuel consumption and housing developments. Furthermore, operation and service user’s management are based on a micro level of data. These include historical, daily and hourly traffic counts, capacity of the system, fare rate and operation hours. Questionnaires were distributed and analyzed using SPSS program to answer several user’s related matters as fare rate, fare validity, operating hours and possibility of using the system. Several interviews needed in order to collect data with representative of some Ministries. A detailed network planning and users estimate system is developed here, utilizing a digital format using X-Cell programming feature. The whole procedure is designed to easily be transferred to any country with very limited Mass Transit System and limited available data except for total daily traffic. The system covers the headways and total number of baggies and buses needed for an integrated system.

As a result, a network is developed; it is consist of two Metro loops, three tram routes and eight rapid bus routes. The total estimated number of riders in the proposed network is close to 900 thousand per day and the generated daily income is around BD 300 thousand.

In order to have sufficient system, proper advertisement and marketing should be considered to attract people to use the system. Furthermore, additional studies should be considered to identify the best model for the system in terms of being elevated from the ground or underground should be carried out.