THE ECONOMIC CASE FOR METRO PASSENGER RAIL IN KUWAIT

Jamal, Esraa[1,3], and Lovegrove, Gordon[2]
[1] Ph.D. Student, The University of British Columbia, Canada
[2] The University of British Columbia, Canada
[3] e.a.jamal@hotmail.com

Kuwait is one of the fastest growing developing countries in the Arabian Peninsula region and is undergoing challenging transportation issues. It is expected to continue to experience rapid growth in the near future as a result of government initiatives aimed at transforming Kuwait into a financial and commercial global investment hub. Kuwait's rapid growth has already increased the pressure on the existing transportation system. Traffic congestion has risen to unacceptable levels, leading to degradation in the quality of life and the environment. Therefore, there is a need for appropriate policies, plans, and projects to provide a safe, affordable, and efficient transportation system to attain sustainable environmental development objectives.

The purpose of this study was to investigate the feasibility of establishing a metro rail service within the state of Kuwait. The environmental, economic, and social costs and benefits of a possible future Kuwait Metro Rail (KMR) project were evaluated using Social Cost Benefit Analysis (SCBA). In addition to direct project costs (e.g. construction, running stock, operations, maintenance) and benefits (e.g. revenue) of traditional CBA, SCBA takes a triple-bottom-line sustainability-focused approach that considers other costs and benefits that are indirect and external to those accrued to the project such as air quality, and safety. Benefits that were taken into account in this study include: improved road safety, improved air quality, energy savings, and ridership revenues. The monetary values of these externalities were determined by using the standard approaches found in the literature. Costs and benefits over the life of a metro rail system were estimated mainly from the recent Middle Eastern metro rail project in Dubai and discounted to calculate Net Present Value (NPV) as well as Benefit-Cost Ratio (BCR). Findings showed that the KMR project would have an NPV of greater than \$86 Billion, and a BCR of greater than five to one, which suggests a very strong economic feasibility, even after sensitivity testing to show the robustness of the results. Moreover, risk analyses using Monte Carlo simulation (MCS) revealed a mean greater than \$24 Billion, with no significant chance of a negative NPV. The Metro system will ease the daily commute for thousands of the workers in Kuwait, reduce energy consumption, increase the road safety, enhance the air

quality, and reduce travel time. Other benefits related to economic spinoffs and increased community connectedness were not explored nor documented, but are also expected.

This research has provided improved data for decision-making by the Kuwaiti government regarding a possible future Kuwait Metro Rail project value to its community. In addition, it sets out a clear, science-based methodology to analyze future investments in other similar projects in the region. Recommended implementation plans include: integrating with local transit, constructing park and ride facilities, and conducting a marketing & communication plan. Despite these significant benefits, barriers to implementation of a Kuwaiti Metro system remain and have delayed the project. Although it is difficult to document with certainty, suspected barriers include: local and domestic political situations, lack of domestic technical expertise, and perceived possible impacts on the Kuwaiti oil industry. The use of SCBA techniques in this study has demonstrated a valuable decision-making tool to produce results that the Kuwaiti government can reference, and has provided an important sustainability-based foundation for reference by other Canadian engineers working in this Middle Eastern region.