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The role of Vehicles' Identification Techniques in transportation planning – The Qatari case study

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Abstract   In a previous paper [3], the present authors introduced through a set of developed interfaces the concept of real-time transportation modeling, and justified the need and importance of Radio Frequency Identification (RFID) Technique in achieving a comprehensive database for strategic planning parameters that can affect passengers' travel behavior and consequently the transport modal split. The research modeling work was based on PTV-Vision software, VISUM and VISSIM that are currently used in most of the international research studies. The research applications are programmed in Microsoft excel and visual basic and thus are compatible with any modeling software. This research application uses the official transport model of Qatar for performing a specific run for the core CBD area of Qatar as a case study for this thesis. The same run was conducted also using the developed research interface, and both results were close and consistent.

Finally, and based on the comprehensive literature review undertaken in this research, in addition to the high accuracy and efficiency proven by the developed real-time modeling tools, the research recommends the implementation of Vehicles Identification Techniques in all countries that have a preliminary ITS infrastructure.

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1. Introduction

This research adds a set of intelligent transportation applications that are compatible with existing ITS systems and provide for traffic and transportation studies a highly accurate real time environment, management, and control. A VISSIM micro-simulation model was created for the purpose of this research with a connection to a set of visual basic applications running simultaneously and performing a real-time re-calculation for the generated traffic based on land use and socio-economic data of each zone, and then redistribute trip matrix using the general concept of production–direction gravity model. The research applications are able to do real-time tests

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2. Case study – Qatar

2.1. Study area overview

Qatar is a leading developing country in the Arab Gulf, and possesses a strong economy which is growing sustainably with a wise optimization between oil and gas fortune and a sufficient investment and development for the local society's economic productivity and scientific capabilities. Qatar population has increased significantly since 2004 (0.7 Million), to reach 1.7 Million in 2010. Future population projections are not finalized yet, and they will be effected by the requirements and consequences of the recent achievement of Qatar in winning the hosting of 2022 FIFA world cup event [1].

The study area (Fig. 1) includes 51,272 population, 30,370 employees, 54,875 employment potential work places, 6870 student seats, 1307 university students seats, 49,618 employers business attractions, 25,935 medical related and other personal business attractions, 1550 restaurants capacity, 10,044 leisure and sport attraction, and 32,125 shopping persons capacity, in addition to 65 mosques. The strategic modeling zones included in this study are shown in Fig. 2.

2.2. Road network

The study area road network includes the following major corridors:

Khalifa Street: this corridor is a major route carrying trips coming from west of Doha towards the west bay area.
Mohamed Bin Thani Street: it carries a major share of trips coming from south-west of Doha towards west bay.
Majles Al Taawon Street: Captures the heaviest percentage of trips coming from Khalifa and Mohamed Bin Thani Streets.
Corniche Street: Collects a big share of the demand coming from Khalifa, Mohamed Bin Thani Streets, and from south of Doha.

2.3. Public transport

Regarding public transport network, it was limited in 2006 to some bus routes serving the above mentioned corridors. The headways in the peak hours is around 15–20 min. Thus the quality of public transport service in 2006 was limited as in most of the private car dependent societies and could not capture more than 5% of the total person-trips demand.

2.4. The Qatar transport model

Transport Master Plan of Qatar (TMPQ) was accompanied by the development of Qatar strategic transport model in 2006, whose purpose was to guide the transport master plan and provide the basis for conducting current and future transportation studies. The TMPQ Model was requested in order to perform the strategic modeling work of this research, but regarding the micro-simulation software, the researcher did request from PTV Vision a student code meter VISSIM dongle in order to connect the research interface to a dynamic micro-simulation file and collect vehicles' data second by second as if reading floating traffic data from the real field.
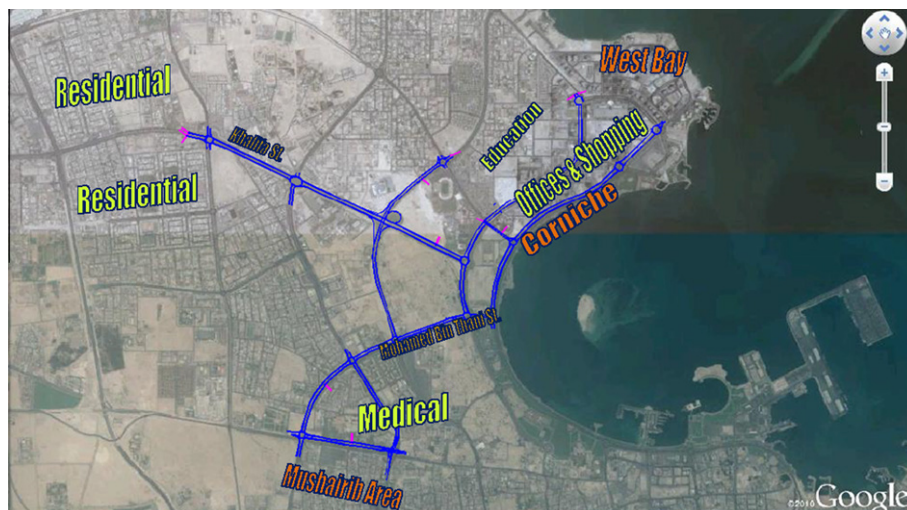

Figure 1   Study area land use distribution.