

Initiating a Smart Transportation System: Jeddah City

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1 ABSTRACT

Jeddah is a busy city, where road networks and expansion are under continuous development. Public commuting is a key issue for many social categories needs to commute within reliable transportation system. Public transportation required the quality of life, in addition to potential hybrid technologies can improve policy efficiency from users' interest point, the paper discusses potential of integrating smart transportation systems within sectors of the city; reference is made to city capacity and traffic densities and major flows of commuting within the heart of the old city. Investigation adopted in a comparative technique, between important congestive allocations nodes in Jeddah analysis in order to test public preferences between commercial or entertainment areas as a start for system initiation.

2 INTRODUCTION

Public transportation is important to be integrated in urban development; it has valuable benefits and provides different types of services. The public transportation system enhances the city's environmental, economic and social aspects. The ultimate purpose of applying such a system is to equally help maximize the number of commuters, travelers and tourists to move within the city, specially people who cannot afford to purchase or rent a vehicle (Walker, 2008). On a city scale, this system helps in minimizing the vehicle traffic during rush hours; it is sustainable, and economically acceptable (Cervero and Murkami, 2009).

Applying a smart transit system in a context of a new transportation system encourages for having special attractions for people passing by. Having a professionally built station is a way of achieving this entertainment. Railway stations mainly provide two functions: the access for transit way platform and the transit information for the customers. Therefore, there should be careful consideration for each part of the station, in order to satisfy the main purposes of its existence and to play a role in improving the surrounding neighborhood.

3 STATEMENT OF RESEARCH

Today, Old Jeddah is subject to all sorts of rapid development pressure, represented in the negative impact of vehicular traffic and corresponding disruption of the fabric of the city; speculative real estate trends linked with vehicular accessibility which introduce new land-use within the historical urban fabric; the new standards of services, facilities and sanitation which are neither adapted nor integrated to the historic fabric.

4 DEFINING SMART CITIES

The purpose of the Smart Cities Mission is to drive economic growth and improve the quality of life of people by enabling local area development and harnessing technology, especially technology that leads to Smart outcomes. Area-based development will transform existing areas (retrofit and redevelop), including slums, into better planned ones, thereby improving live ability of the whole City. New areas (green field) will be developed around cities in order to accommodate the expanding population in urban areas. Application of Smart Solutions will enable cities to use technology, information and data to improve infrastructure and services. Comprehensive development in this way will improve quality of life, create employment and enhance incomes for all, especially the poor and the disadvantaged, leading to inclusive Cities.

4.1 The first question is what is meant by a 'smart city'

The answer is, there is no universally accepted definition of a Smart City. It means different things to different people. The conceptualization of Smart City, therefore, varies from city to city and country to country, depending on the level of development, willingness to change and reform, resources and aspirations of the city.

4.2 Smart Cities Mission

the objective is to promote cities that provide core infrastructure and give a decent quality of life to its citizens, a clean and sustainable environment and application of ‘Smart’ Solutions.

The focus is on sustainable and inclusive development and the idea is to look at compact areas, create a replicable model which will act like a light house to other aspiring cities.

The Smart Cities Mission of the Government is a bold, new initiative. It is meant to set examples that can be replicated both within and outside the Smart City, catalyzing the creation of similar Smart Cities in various regions and parts of the country.

4.3 Infrastructure elements

The core infrastructure elements in a Smart City would include:

- Adequate water supply,
- Assured electricity supply,
- Sanitation, including solid waste management,
- Efficient urban mobility and public transport,
- Affordable housing, especially for the poor,
- Robust IT connectivity and digitalization,
- Good governance, especially e-Governance and citizen participation,
- Sustainable environment,
- Safety and security of citizens, particularly women, children and the elderly,

Health and education buildings and the loss of ‘image’ and prestige of the historic centers and the misconceived ‘modernity’ in many locations of the center. Key buildings, mosques and merchants' houses of historical Jeddah are concealed today behind modern high rise buildings and skyscrapers that make up Jeddah's bustling business district. This severe pressure results in a dramatic treats for the continuity of the historical city into the future.

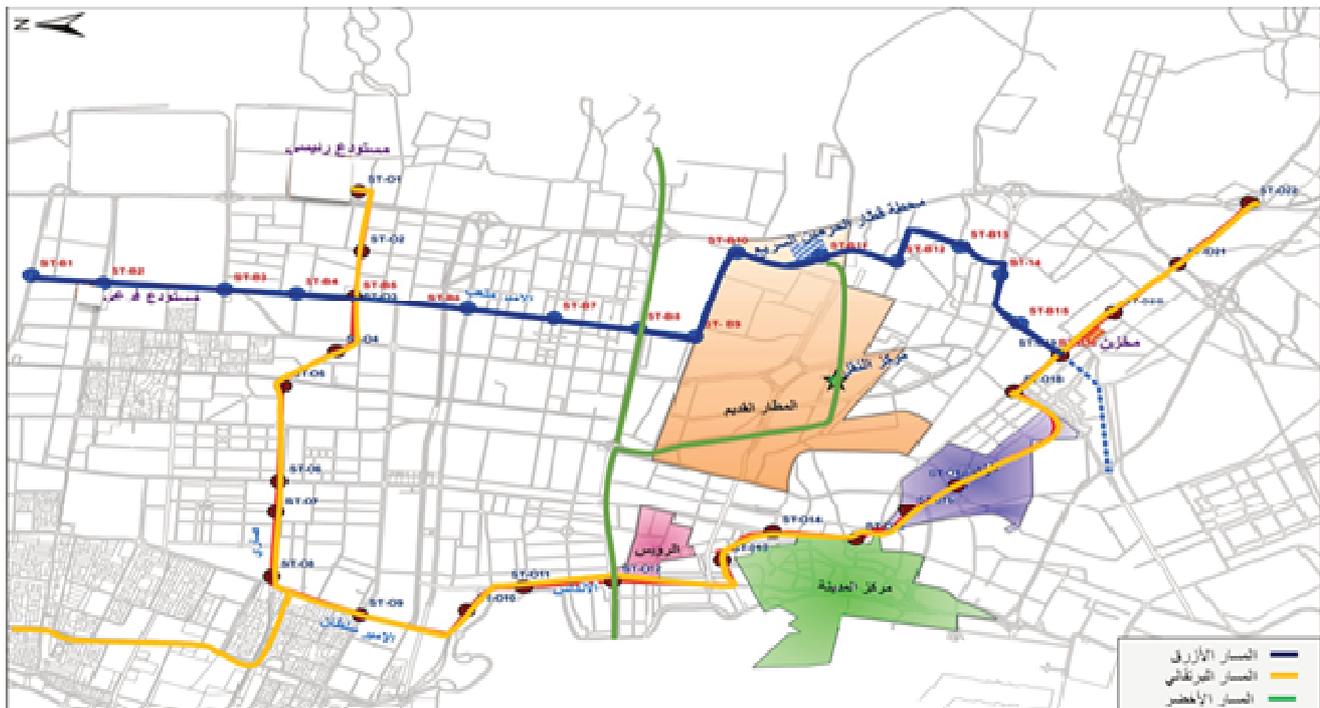


Fig. 1: Planned municipalities network (METRO)

5 PLANNED MUNICIPALITIES NETWORK (METRO)

As a result of sustained national economic development over several decades, most of the towns and cities in Saudi Arabia became developed in a way that had never before been experienced in the Arabian Peninsula. Not surprisingly, the scale and rates of growth which have been experienced, particularly since the early 1970s (A. Daghistani, 1993).

the 'boom' period of 1974-1983 saw the rapid physical development of the city, which was not always in accordance with the newly established planning policies. The remainder of this paper is concerned with the analysis of two major aspects of the original Master Plan's policies, in an attempt to discover some of the factors which have contributed to the unsuccessful and successful implementation of planning policies in Jeddah.

These case studies included the policies for retail development, Jeddah Corniche development, desalination unit, sharm abhour expansion, road network.

At this early stage transportation system was not yet considered as a community requirement since the services were mostly considering the pelegrinage route from and to the two holy cities via Jeddah airport.

6 METHODOLOGICAL APPROACH: POTENTIAL OF DEVELOPING TRAMWAY?

6.1 Development Potentials:

Jeddah does not have an extensive public transport system and the easiest way of getting around the city is by private vehicle. Women are not allowed to drive a car in Saudi Arabia and are therefore reliant on male members of their family or a driver for transport. It's relatively easy for male visitors to rent a car and a number of well-known international car hire companies are located at the airport and in the city Centre.

6.2 City Expansion

The explanation of rapid expansions of Jeddah city from different axis has resulted in an obvious sectoral development appears to be relatively straightforward:

(a) Because of the importance of the connections between Jeddah and the two Holy Cities of Makkah and Madina, the Makkah and Madina roads (leading east and north respectively) were the first to be surfaced. Properties close to surfaced roads conveying a certain social evolution, which is evident towards areas in the north (New airport and future residential developments) as well towards the east (along the haramain road major connector to the holy cities).

(b) Immigrants to the city are increasing due to the economical development as well as the industrial city towards the south with moderate social level according to their careers and everyday living activities.

(c) At an early stage in the city's development, the northern and eastern areas came under the ownership of large landowners who, in order to maximize their returns, proceeded to sub-divide their land into large grid-iron plots (initially for villa development, but as land values rose, the more central plots were used for high-status apartments).

However, this expansion in infrastructure has not been able to accommodate increases in travel demand, hence causing high levels of congestion. Conversely, Jeddah's enormous spatial expansion has caused large changes in the daily share of travel modes (M. Aljoufie, 2012).

Current land use and transport planning practice in Jeddah municipality cannot keep up with rapid urban growth and consequent land use and transport interaction issues. Planning and policy practice focus on separate visions, causing that specific land use or transport issues should not be dealt with in isolation.

6.3 Community requirement

According to a survey done recently as part of capstone preparation thesis (Manal, 2016), typical identified requirements were aligned with smart cities initial founding as a sample of initial public requirements in figure 2.

The major investigated points are demonstrated, mainly covering:

- Potential of integrating smart transportation systems within sectors of the city; reference is made to city capacity and traffic densities and major flows of commuting within the heart of the city.

- Secure and facilitate the movement of residents, tourists and visitors in the city of Jeddah. and guiding them to the most important monuments to visit safely and fast. and giving women’s greater freedom of movement safely on their own.

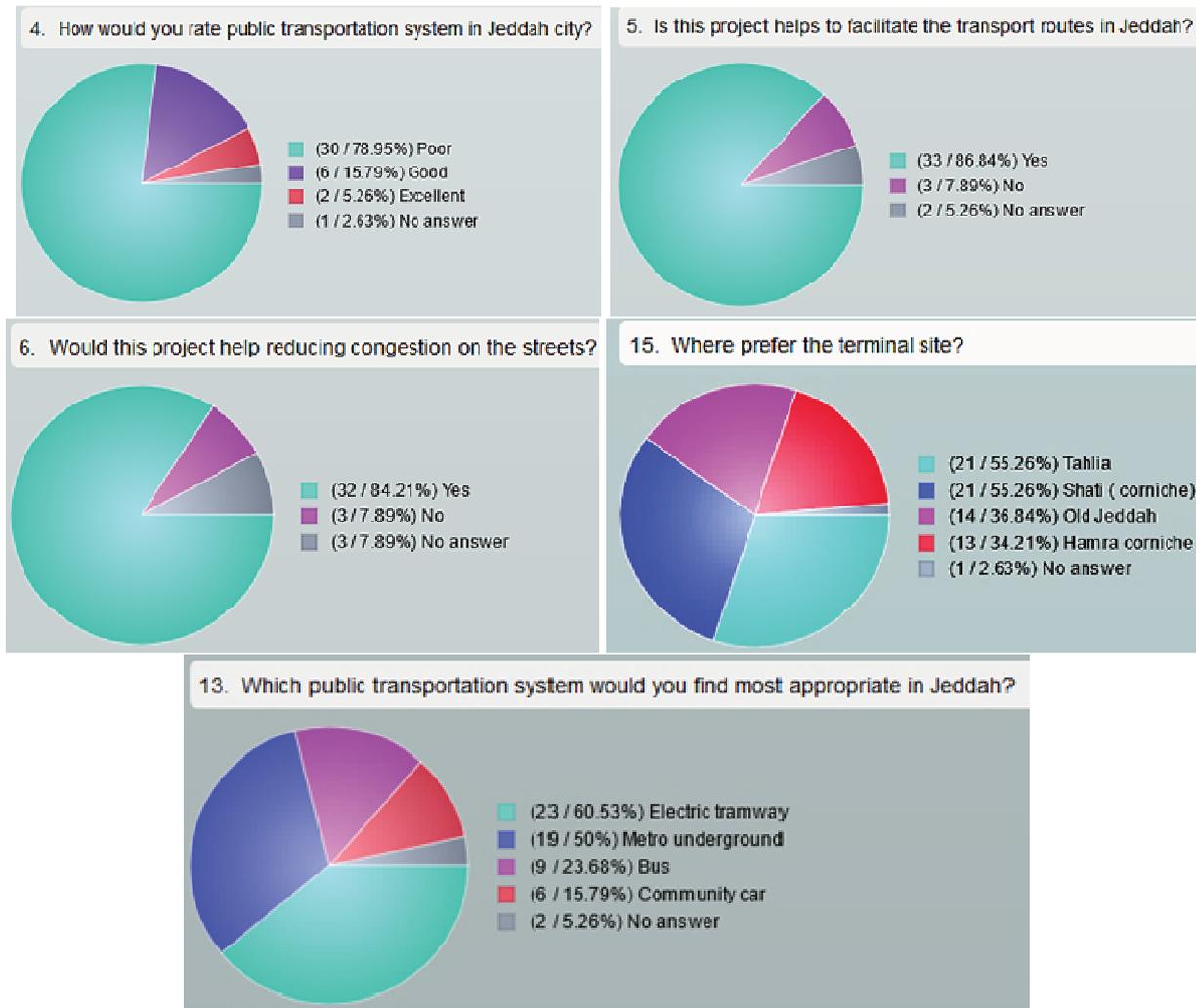


Fig. 2: Initial Public Requirements Survey.

7 SMART CITY APPROACH POTENTIALS:

- There are many factors of Saudi vision 2030 that support and motivate the Initiating a smart transportation system in Jeddah city (Tram System):
- The high quality of Applying a smart transit system
- New transportation system encourages for having special attractions that support all the possible factors and paths that will lead to this level of quality
- With this new Tram System, using the electrical power will saveoil investments and that’s will be the strongest factor that will support.
- initiating a smart transportation system in Jeddah city (Tram System).
- revitalization strategies, like the initiation of campains among young generations as well as regular visitors.

8 PROPOSED TRAM SYSTEM:

Applying a smart transit system in a context of a new transportation system encourages for having special attractions for people passing by. Railway stations mainly provide two functions: the access for transit way platform and the transit information for the customers. Therefore, there should be careful consideration for

each part of the station, in order to satisfy the main purposes of its existence. Major Project Aspect are cited in the following points:

8.1 Typology

A tram, usually known 'street car', 'trolley car' or 'trolley', is a car which runs on fixed rails and is designed to travel on streets, sharing road space with other traffic and pedestrians.

Tramway is a rapid transit system inside the city regularly stops to load or unload passengers.

8.2 Concept and philosophy

- tram system connecting with the proposed metro line by a common point and design its terminal (station)
- Secure and facilitate the movement of residents, tourists and visitors in the city of Jeddah. and guiding them to the most important monuments to visit safely and fast. and giving women's greater freedom of movement safely on their own.
- Potential of integrating smart transportation systems within sectors of the city; reference is made to city capacity and traffic densities and major flows of commuting within the heart of the city.

8.3 Goals and Objectives

The proposed project has environmental, economic and social objectives:

8.3.1 Environmental Objectives:

- Reducing the dependency of using petroleum for private cars.
- Reducing the air pollution and energy consumption.

8.3.2 Economic Objectives

- Public transportation is affordable and not expensive on the individuals
- Helps economic growth

8.3.3 Social Objectives

- Women, children and the elderly will find a safe transportation system that takes them to schools, offices, or entertainment places.
- It will positively impact people studying and working in remote areas, this system will provide them a safe and efficient mean of transportation.
- The station public areas will help people to gather and socially interact.

8.4 Site Selection

Based Upon considering the above potentials of Jeddah city developments, as well as the requirement of smart cities growth the following site in Tahlia main street connection has been selected in figure 3, the site has a strong potential then the area is mostly commercial and residential orientation.

The weighted criteriain table 1 indicates the various aspects considered while investigating community requirements along the expected infrastructure development as well as Jeddah metro proposed route and main stations.

The selected On tahlia street, provides for connectivity along major street network of Jeddah, as well as promotes the economical, environmental and social perspectives in the area.

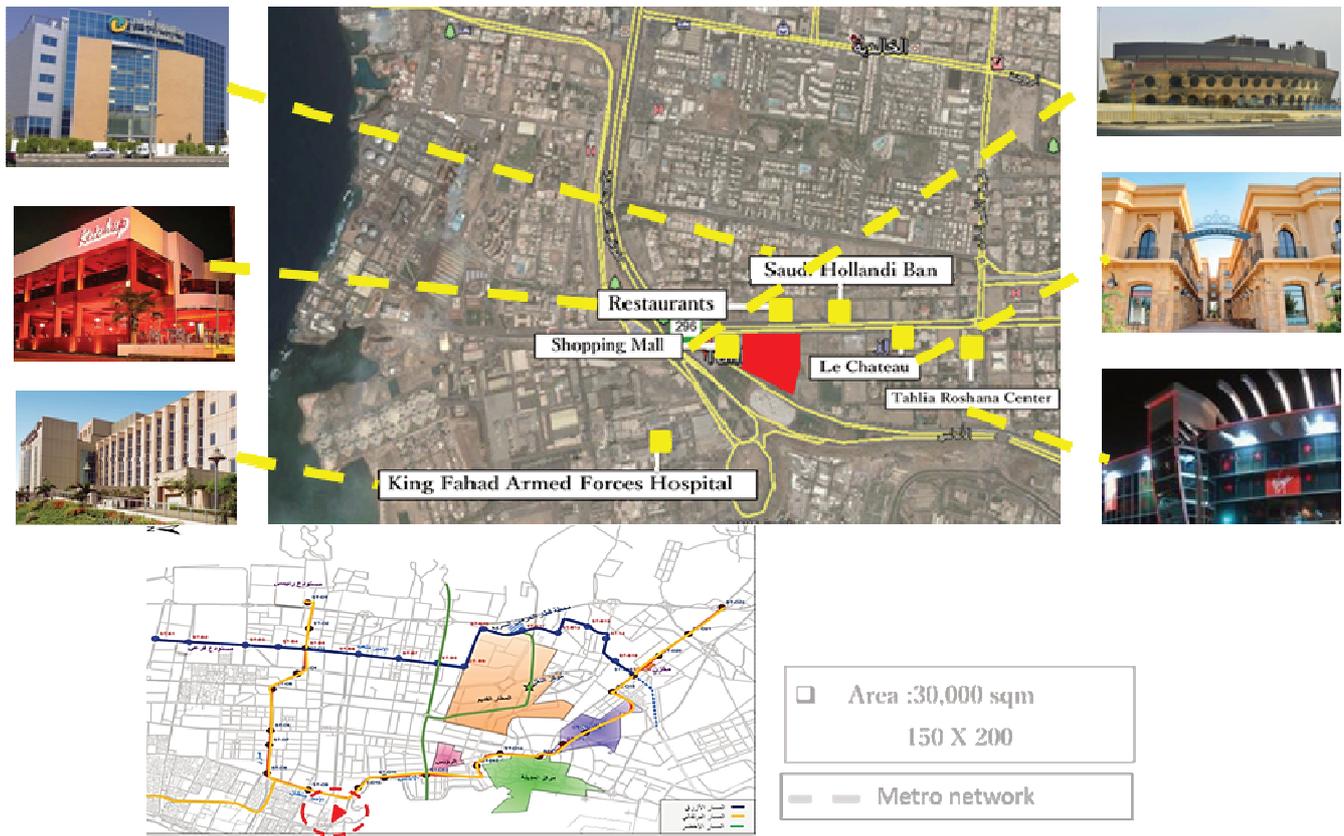


Fig. 3: Initial Public Requirements Survey.

Criteria	Corniche Site (1)	Tahliah Site (2)	Old Jeddah Site(3)
Access / Traffic (WF=3)	12	15	10
shape/Proportional (WF=2)	8	10	6
Topography (WF=1)	4	5	4
Future Development (WF=3)	15	12	15
Surrounding (WF=2)	8	10	6
Views (WF=2)	10	10	6
Visibility (WF=2)	6	8	6
Total	63	70	53

Table 1: Site Selection Weighted Criteria.

9 CONCLUSION

On a closing note, it is important to emphasize on the fact that planning, designing, building, operating and maintaining transit systems have both direct and indirect sustainable impacts on the society. In other words, transit systems have the potential to increase the environmental quality, the quality of life, and the economic prosperity of a community.

Therefore, proper planning and designing of a scalable smart transportation system is crucial in every developing and booming country since it has a direct impact in preserving communities pleasant and increasing their productivity. Public transportation systems have also, the power of moving people faster, safer and to further destinations in a ridiculous reduced time, which ultimately increases the overall productivity of the whole country.

"The goal of the public transportation project in Jeddah is to provide the best and most suitable types and choices for public transportation, in addition to the easy use of car parks that are connected to public transportation paths on the city's borders, to decrease traffic congestions inside the city and lessen pollution.

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