



USER'S SATISFACTION LEVEL OF TRANSPORT SYSTEM QUALITY IN JEDDAH CITY, SAUDI ARABIA

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ABSTRACT

Provision of efficient transport system is crucial, particularly in fast growing cities such as Jeddah in Saudi Arabia. Jeddah city has witnessed a dramatic urban growth and land use changes over the last four decades. This has caused significant and critical changes in transport system and its quality. This paper attempts to assess the transport system quality in Jeddah. It measures the satisfaction level of Jeddah transport system users toward the current state of transport system in Jeddah city. Questionnaire was distributed to different age groups of Jeddah residents using different survey methods. Results show that all different age groups of Jeddah residents with different socio-economic attributes have a common dissatisfaction of current transport system quality in Jeddah. The results of this study assist transport planners in identifying the appropriate transport interventions policies and plans in order to provide sustainable and effective transport system in the city.

Keywords: transport, satisfaction, online survey, Jeddah.

INTRODUCTION

Transport system is vital in urban environment as it facilitates the mobility and movement of people and good; and stimulates urban development (Meyer and Miller, 2001). The provision of efficient transport services is vital in urban and transportation planning. Fast growing cities experience notable challenges in providing efficient transport system. Rapid urban growth and excessive spatial expansion stimulate more traffic and high dependence on private vehicle, which in turn cause congestion, air pollution, emissions and economic losses (Zhao, 2010; Aljoufie *et al.*, 2013).

To reduce the negative effects of the increasing motorization and the use of private vehicle, local governments in many fast growing cities have implemented policy interventions. These interventions are often very costly and not always politically feasible (Taniguchi *et al.*, 2014), particularly in big cities. Accordingly, measuring the perception and satisfaction of people of the transport system is crucial as the travel behavior does not always reflect experiences and satisfaction. In fact, many agree that experiences, rather than behavior, provide more insight and a competitive advantage for developing travel services that meet the needs of the user (Taniguchi *et al.*, 2014). The study of commuter perceptions and satisfaction has become increasingly prevalent in the field of transportation (St-Louis *et al.*, 2014) and the focus on travel satisfaction has increased during recent years in several ways (Taniguchi *et al.*, 2014).

Most of main cities in Saudi Arabia have witnessed a rapid urban growth over the last five decades which has caused complex transportation challenges for the local authorities. Jeddah city as such, has witnessed variable rapid urban growth and dramatic spatial expansion from the early 1960. The population of Jeddah

has grown rapidly from 147,900 in 1964 to about 3, 247, 134 in 2007. Jeddah urban mass has expanded considerably from 18, 315 ha in 1964 to 54, 175 ha in 2007 (Aljoufie *et al.*, 2013). This has resulted in major changes travel behavior and haphazard transportation issues in Jeddah and thus affected the quality of the transport system.

Excessive expansion of Jeddah spatially and its dramatic changes of land use have caused a significant impact on the daily share of travel modes (Aljoufie *et al.*, 2013). In fact, the share of non-private vehicle daily trips has noticeably decreased. The share of daily trips of public transport has declined considerably from about 19% in 1970 to almost 2.3% in 2007 (Aljoufie *et al.*, 2013). The share of other transport modes, such as cycling and pedestrian trips, has considerably reduced from about 31% of the total trip in the year 1970 to about 4.6% in the year 2007 (Aljoufie *et al.*, 2013). As Jeddah's urban area expanded dramatically and the compactness of the city reduced, the travel pattern has been affected and the daily share of private vehicles trips has been stimulated. The share of daily private vehicle trips increased from 50% in 1970 to 96% in 2012. This has coincided with poor public transport coverage and service. As a result, high levels of mobility occurred all over the city and congestion dominated Jeddah's streets in both peak and non-peak hours (Municipality of Jeddah, 2006; IBI 2007). Moreover, average speeds on the Jeddah roads, particularly highways and main roads, are decreasing, while traffic safety is declining (IBI 2007; Aljoufie *et al.*, 2013). Conversely, transportation emissions and trip durations are increasing (IBI 2007; Aljoufie *et al.*, 2013).

Given these challenges, measurement of satisfaction level of Jeddah people toward the current state of transport system is vital. To date, this has received a limited attention in Jeddah. Although, several policy



interventions were proposed by Jeddah municipality, the level of Jeddah people satisfaction toward the current state of transport system was not considered. Thus, this paper attempts to assess the transport system quality in Jeddah city by measuring the satisfaction level of Jeddah people toward the current state of transport system.

This paper is organized as follows. Firstly it outlines the methods and the data used for analysis. Next, the results of the survey will be discussed. Finally, it draws some conclusions and discusses directions for future research.

Jeddah city

Geographical context

Jeddah city is the first commercial city in Saudi Arabia and considered the second main city in Saudi Arabia, after Riyadh the capital. Jeddah located on the western region on the Red Coast, Figure-1. Originally, Jeddah began as a small fishing village surrounded by a wall. In 1947, this wall was destroyed which stimulated Jeddah's growth from a small village to a modern metropolis.

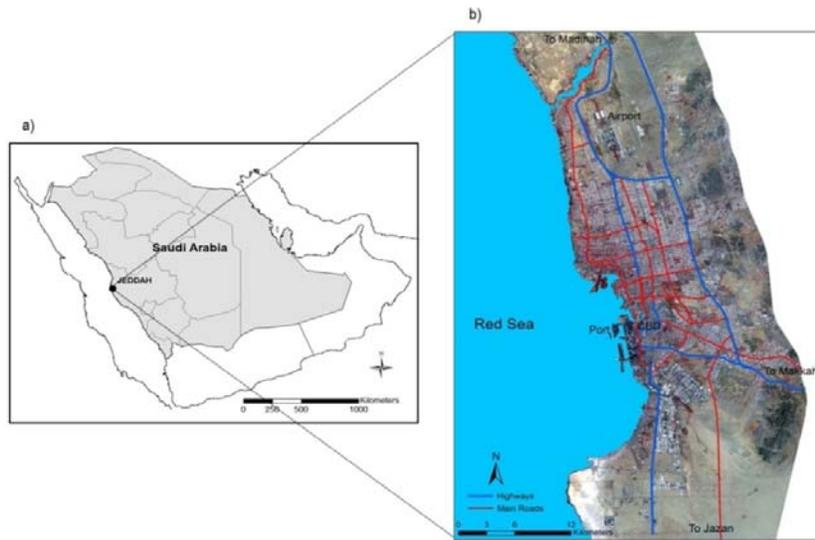


Figure-1. a) Geographic location of Jeddah in Saudi Arabia; b) Jeddah city

Urban growth and transportation

Urban growth is strongly related to transportation with reciprocal causes and effects (Aljoufie *et al.*, 2013). Jeddah city has experienced a rapid urban environment changes and a dramatic population growth. This has affected the travel pattern in Jeddah and caused critical challenges for Jeddah urban and transportation planners. As a result, Jeddah's transport mode share has dramatically altered. While the share of the non-private vehicle modes daily trips has declined to about 7 % in the year 2007 from about 50 % in the year 1970, the share of daily trips by private vehicle increased to about 93% in the year 2007, from about 50% in 1970 (MOMRA, 1980; Municipality of Jeddah, 2006; IBI, 2007).

The population of Jeddah was rapidly increased, from 147, 900 in the year 1964 to 3, 430, 697 in the year 2010, while the urban mass of Jeddah has significantly extended from about 18, 315 hectares in the year 1964 to about 54, 175 hectares in the year 2007 (Aljoufie *et al.*, 2013). This has augmented the total number of the daily trips from about 293, 370 trips in the year 1970 to about 6, 051, 883 trips in the year 2007 (MOMRA, 1980; IBI 2007). This high mobility has place pressure on the

Jeddah's existing transportation infrastructure (Aljoufie *et al.*, 2013). Thus, congestion is dominant on Jeddah's streets in both peak and non-peak hours (IBI, 2007; Municipality of Jeddah, 2009).

Jeddah currently witness a haphazard transport issues. Although, several polices were proposed by Jeddah municipality to solve these issues, the level of Jeddah people satisfaction toward the current state of transport system was not considered and incorporated. This study covers attempts to measure the overall satisfaction of Jeddah people toward the current transport system.

METHODOLOGY

Questionnaire

Questionnaire was designed to measure the satisfaction level of Jeddah people toward the current state of transport system. It consisted of three main parts. First part includes individual's socio-economic attributes. This part is important as the transport quality observation differs between individuals. This part included questions



about age, gender, nationality, education level and income level.

Second part includes the individual's satisfaction of the current transport system quality in Jeddah. In this part, respondents were asked to indicate their personal evaluation of current transport system quality. Specifically, respondent were asked to indicate their satisfaction of the followings transport aspects:

- Noise level
- Parking
- Roads condition
- Footpaths condition
- Traffic and congestion
- Public transport
- Road safety
- Through traffic
- Disables requirements

Respondents were required to indicate their satisfaction with defined transport aspects using a Likert scale ranging from 1 for satisfied; 2 for neutral; and to 3 for dissatisfied.

Finally, third part includes the individual's recommendations and suggestions toward the current transport system quality in Jeddah. In this part, respondents were asked to indicate their possible recommendations and suggestions toward current transport system quality in an open-ended question. The intention is to measure the contribution of Jeddah people toward improvement of transport quality and policy intervention.

Survey

To increase the rate of respondent and to reduce the burden involved in completing the questionnaire, the questionnaire was deigned to take 5-10 minutes to complete. Different survey methods were used. The questionnaire was designed online on Survey Monkey. Survey Monkey is an internet based resource for hosting online internet surveys that allows users to word their own questions and collect respondent data into a single database (Harland, and Drew, 2013). The survey was conducted between February 5th and March 5th 2014. The survey targeted King Abdulaziz university staff and students, shopping centers visitors, and sample of Jeddah population. Respondents were invited to participate using different methods: 1) email invitations to staff and students of the Faculty of Environmental Design at King Abdulaziz University, 2) Smart phones and notepads devices for shopping centers visitors, 3) facebook pages targeted Jeddah users; 4) online King Abdulaziz University students forums, and 5) advertisement of survey in social networking sites such as Whatsapp and Twitter.

RESULTS

Respondents

A total of 1093 respondents were participated in the survey. Out of the total respondents, 356 questionnaires were partially filled out while 737 questionnaires were fully completed. The fully completed questionnaires were considered in the analysis.

Socio-economic attributes

Table-1 shows the socio-economic attributes of the respondents. A varied socio- economic attributes of the respondents is noticed in the considered sample of questionnaires.

**Table-1.** Socio-economic attributes of the respondents.

Socio-economic attributes	Frequency	Percent
Age		
20-30 Years	339	46.0
31-40 Years	166	22.5
41-50 Years	145	19.7
51 Years and above	87	11.8
	737	
Gender		
Male	451	61.2
Female	286	38.8
	737	
Nationality		
Saudi	656	89
None- Saudi	81	11
	737	
Education level		
Primary	9	1.22
Secondary	108	14.65
Diploma	79	10.72
Bachelors	433	58.75
Masters	75	10.18
Doctorate	33	4.48
	737	
Monthly income level		
Less than 5000 SAR	202	27.41
5000 -10000 SAR	183	24.83
10001 -15000 SAR	133	18.05
More than 15000 SAR	219	29.72

Table-1 shows that the majority of respondents (46 %) are between 20 and 30 years. About 22.5% of the respondents are between 31 and 40 years. Respondents between 41 and 50 years are about 19.7% while about 11.8 % accounted for respondents aged 51 years and above.

Gender information of the respondents shows that 61.2 % are male and 38.8 are female. On the contrary, analysis of the collected data reveal that the sample is dominated by Saudi nationality wherein 89% of the respondents are Saudi and 11% are non-Saudi as depicted in Table-1.

Education level information shows a diversity of education level of the respondents as depicted in Table-1. The majority (58.9 %) of respondents are with bachelor's education level. 14.65 % of the respondents are educated up to secondary level, while 10.72 % and 10.18% with

diploma and masters education level respectively. Results also show that 4.48% of the respondents are with doctorate education level, whereas only 1.22 % of the respondents have a low education level up to the primary levels.

Analysis of the collected data reveals a varied monthly income level of the respondents as shown in Table-1. 27.41 % of the respondents earn less than 5000 SAR monthly. The proportion of the respondents who earn between 5000 and 10000 SAR monthly is 24.83 %, while respondents with monthly income between 10001 and 15000 SAR is 18.05 %. The largest proportion of the respondents (29.72 %) earns more than 15000 SAR monthly.



Satisfaction of the transport system quality

Table-2 and Figure-2 depict the survey respondents' satisfaction level of the current transport system quality in Jeddah. The satisfaction with the defined

transport aspects is categorized in 3 classes: satisfied; neutral; and dissatisfied. The detailed respondents' satisfaction level of each transport aspect is explained below.

Table-2. Respondents satisfaction level of the transport system quality.

Transport Aspects	Satisfied %	Neutral %	Dissatisfied %
Noise level	12.8	2.1	85.1
Parking	7.76	0.66	91.58
Roads condition	2.97	0.33	96.7
Footpaths condition	9.08	1.49	89.43
Traffic and congestion	6.6	0.17	93.23
Public transport	6.1	2.32	91.58
Road safety	23.1	0.83	76.07
Through traffic	13.86	1.32	84.82
Disables requirements	2.14	12.21	85.65

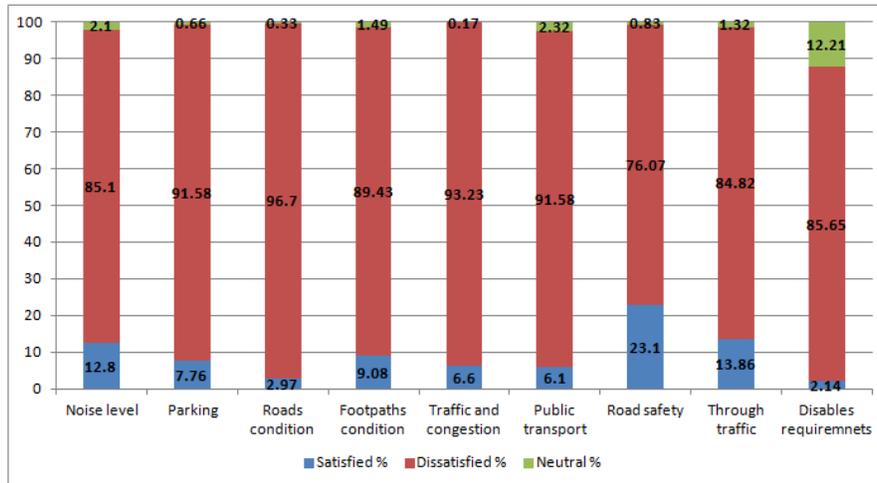


Figure-2. Respondents satisfaction level of the transport system quality.

Noise level

Table-2 and Figure-2 indicate that majority of the respondents (85.1%) dissatisfied with Jeddah transport system noise level. This can be explained by huge traffic volumes on Jeddah roads which increases the general level of ambient noise within the urban setting. 12.5 % of the respondents were satisfied with the noise level, while 2.1% of the respondents were neutral about this aspect.

Parking

Results reveal that a very high proportion of the respondents (91.58%) are dissatisfied parking in Jeddah. This is expected as parking is a major transport problem in Jeddah city. Only 7.76 % of the respondents were satisfied with parking in Jeddah, while a very low proportion of the

respondents (0.66%) were neutral about this transport aspect. It is noticed that parking demand significantly exceeds the parking supply in the city centre, highly dense districts and main commercial corridors particularly during traffic peak hours. Results suggest that parking need a prompt policy intervention from Jeddah municipality.

Roads condition

Table-2 and Figure-2 indicate that nearly every one of the respondents (96.7%) dissatisfied with Jeddah roads condition. This can be justified by bad roads condition of Jeddah roads which is tangible daily by road users (both drivers and passengers) in Jeddah. Only 2.97 % of the respondents were satisfied with the roads condition in Jeddah, while a very low proportion of the



respondents (0.33%) were neutral about this aspect. In fact, most of Jeddah roads were constructed between 1970 and 1980 with minor interventions afterward. These results imply urgent roads condition intervention with priorities plan.

Footpaths condition

Results reveal that majority of the respondents (89.43%) dissatisfied with Jeddah footpaths condition in Jeddah. This is expected as pedestrian experienced difficulties in walking in Jeddah. 9.08 % of the respondents were satisfied with footpaths condition in Jeddah, while a very low proportion of the respondents (1.49%) were neutral about this transport aspect. Results suggest that footpaths condition require a prompt policy intervention from Jeddah municipality.

Traffic and congestion

Table-2 and Figure-2 indicate that most of the respondents (93.23%) dissatisfied with Jeddah traffic and congestion. This can be justified by huge traffic volumes tangible daily by road users (both drivers and passengers) in Jeddah, dramatic increase of the number of total trips and dominant trips by private vehicle. Only 6.6 % of the respondents were satisfied with the traffic and congestion in Jeddah, while a very low proportion of the respondents (0.17 %) were neutral about this aspect. These results imply urgent transport policy interventions from Jeddah municipality.

Public transport

Results reveal that majority of the respondents (91.58%) dissatisfied with public transport in Jeddah. This is expected, given the current deficiencies of public transport in Jeddah. Low accessibility, bad buses conditions, unscheduled services, deficient infrastructure are common problems of the current public transport in Jeddah (Aljoufie, 2014). 6.1 % of the respondents were satisfied public transport in Jeddah, while a low proportion of the respondents (2.32%) were neutral about this transport aspect. Results suggest that an improvement of public transport is vital and necessitate a high level of attention from Jeddah municipality.

Road safety

Table-2 and Figure-2 indicate that the majority of respondents (76.07%) dissatisfied with Jeddah road safety. This can be justified by rising number of accidents in Jeddah. However, 23.1 % of the respondents were satisfied with road safety in Jeddah. This can be related to bad driving behaviors of drivers (i.e. high speed ... etc) which are seen normal form the youth drivers in the absent stringent traffic regulations enforcement. Results also indicate a very low proportion of the respondents (0.83 %) were neutral about this aspect. These results imply urgent traffic regulations by traffic police department in Jeddah in

conjunction with appropriate transport policy interventions related to safety by Jeddah municipality.

Through traffic

Results reveal that majority of the respondents (84.82%) dissatisfied with through traffic problem in Jeddah. Conversely, 13.86 % of the respondents were satisfied through traffic problem in Jeddah, while a low proportion of the respondents (1.32%) were neutral about this transport aspect. Results suggest that network connectivity and roads hierarchy policy interventions must be considered by Jeddah municipality.

Disables requirements

Results reveal that majority of the respondents (85.65%) dissatisfied with Jeddah disables requirements in Jeddah. This is expected as disables experienced serious transport difficulties in Jeddah. Only 2.14 % of the respondents were satisfied with disables requirements in Jeddah, 12.21 % of the respondents were neutral about this transport aspect. Results suggest that disables requirements necessitate a prompt policy intervention from Jeddah municipality.

Recommendations and suggestion toward transport system quality

Results reveal a valuable recommendations and suggestions of Jeddah people toward the current transport system quality. Most of respondents recommend the provision of efficient public transport system. This is justified as most of the respondents were critical of the current public transport system condition in Jeddah.

Some respondents indicate the need for traffic rules and regulations enforcement. In essence, this is related to the issues of traffic safety in Jeddah. Moreover, some respondents point out the importance of parking regulations in Jeddah city. Traffic management, intelligent transport systems (ITSs) and parking pricing were suggested individually from some respondent.

The recommendations and suggestions of Jeddah people toward the current transport system quality were considered to be highly relevant to strategic planners, urban planners and transportation planners to develop appropriate policy interventions.

DISCUSSIONS

The potential effectiveness of transport policy measures highly depend on road users experience (Taniguchi *et al.*, 2014). In this study the satisfaction level of Jeddah people toward the current state of transport system in Jeddah city was measured. Results indicate a common dissatisfaction of the current transport system in Jeddah as depicted in Table-2 and Figure-2. The average dissatisfaction level of Jeddah people toward current transport system quality is 88.24 %, while the average satisfaction is only 9.37%. A very low proportion of



Jeddah people were neutral about the quality of the current transport system in Jeddah.

The results clearly demonstrate that all different age groups of Jeddah residents have a common dissatisfaction of current transport system. It is also noted that although respondent's socio-economic characteristics differ, which mean a high unbiased perception; there is a dominant dissatisfaction of the current transport system. This finding is expected, given the current haphazard transport issues in Jeddah. All the defined transport aspects received a high level of dissatisfaction. However, roads condition, traffic and congestion, public transport and parking were the most important and significant transport aspects that survey respondents mostly dissatisfied with in Jeddah. These results imply urgent transport policy interventions from Jeddah municipality toward these aspects.

In addition to that, respondents have suggested and recommended some valuable and relevant policy interventions including: provision of public transport, enforcement of traffic rules and regulations, parking regulations and pricing, traffic management and ITSs.

These findings assist Jeddah urban and transport planners in formulating the appropriate transport interventions policies and plans. Current urban and transportation policy interventions in Jeddah lack of effective participation of Jeddah people. This study assists Jeddah urban and transport planners to understand the perception of people toward the current transport system quality in Jeddah. It can help urban and transport planners in Jeddah to priorities there policy interventions based on the transport system users perception and profile. Thus, sustainable and effective transport system can be achieved in the city.

CONCLUSIONS

This paper has attempted to assess the transport system quality in Jeddah city by measuring the satisfaction level of Jeddah people toward the current state of transport system.

Results indicate that all different age groups of Jeddah transport system users with different socio-economic attributes have common dissatisfaction of current transport system quality in Jeddah. Although, all the defined transport aspects received a high level of dissatisfaction; roads condition, traffic and congestion, public transport and parking were the most critical transport aspects in Jeddah and need an urgent interventions.

The results of this study facilitate the identification of appropriate policy interventions by Jeddah urban and transport planners. This in turn, can help in achieving sustainable and effective transport system in Jeddah. Further studies with the same methodology are highly recommended to include different transport and urban aspects in Jeddah.

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