

Full Length Research Paper

Analysis and establishment of bus rapid transit (BRT) on customer satisfaction in Tehran

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Accepted 21 July, 2010

This research aims at exploring and analyzing the Bus Rapid Transit (BRT) in passengers' satisfaction in Tehran City, which has been the huge event in public transportation. In doing this research, after exploration of models and approaches in service quality, Vahed Company, as public services organization, serves passengers and uses quality models that emphasize customer satisfaction. However, the conceptual model based on primary and sub hypothesis was designed. For gathering data, two questionnaires were used for BRT passengers and customers satisfaction. The research hypotheses were tested by a correlation test and all the hypotheses were verified. The sequences of priorities in passengers' satisfaction were drivers' behavior, ergonomics, bus velocity and service item. There was a significant relationship between passengers' satisfaction and BRT quality. Also, it was concluded that drivers' behavior item with mean of 1.99, bus velocity with mean of 2.04, ergonomics item with mean of 2.87 and service quality of BRT with mean of 3.10 were from first to fourth of the passengers' satisfaction priority, respectively.

Key words: BRT, customer satisfaction, servqual, TQM, service quality.

INTRODUCTION

In one type of category, we can divide internal urban transportation to public and private transportation. The target of this research is determination relation between passengers (customer) satisfaction and establishment of bus rapid transit (BRT) in Tehran that results of this research can use for development and increment of effectiveness of BRT lines in Tehran and the other huge cities. In the research, drivers behavior, ergonomics, speed, ITS and services item were explored by two questionnaires (SERVQUAL questionnaire and BRT questionnaire) and all of hypothesizes were verified by correlation test.

Tehran Vahed Company is as the largest company for public transportation to citizens' services in Tehran. An important factor for customer satisfaction is quality of services and we used of SERVQUAL model for determination

of gap between what we expect and what is given. (Joseph et al., 2003)

LITERATURE REVIEW

Research literature gives quality and customer satisfaction and BRT elements. Customer satisfaction is a broad concept that includes perceived evaluation of product and service (Leem and Yoon, 2004). Bathie and Sarkar (2002) in their paper started with the observation that both marketing and TQM had a core value in common – a customer focus. From the process approach (principle in ISO 9001:2000), there is great potential to use it in operationalizing marketing. Chien et al. (2002) stated that many companies fail to implement customer satisfaction owing to lack of experience, or not being able to keep up with the continuous implementation of customer satisfaction (requirement of the ISO 9001:2000).

Singh and Singh (2009) try to develop an understanding

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understanding of the change in innovation in services from technological adoption to complex complementary changes in technologies, skills and organization. They attempt to look at the managerial perspective of services innovation and the infrastructural setup needed for an optimal system. The paper by Zineldin (2005) examines the product and service quality and customer relationship factors that influence the customer selection and image of the principal banks. Zheng and Jiaqing (2007) present the actuality of South-Centre Corridor Bus Rapid Transit line of Beijing in China, and summarize and analyze the application effect from the management condition, service level, and social benefit. After the regular bus lines at Beijing South-Centre Corridor being adjusted stage by stage, the operation environment has been greatly advanced, and the volume as well as speed of vehicles has obviously improved; with the improvement of the service level, the reduction of traveling time of the passenger, the improvement of the satisfaction level, the improvement of the bus speed, the reduction of delay, the improvement of the punctuality rate, the improvement of the transit efficiency, and the increase in the investment yield, the BRT is exactly “the third mode” existing between orbit transit and regular bus transit. Pucher et al. (2005) describes the public transport reforms in Seoul and assesses their impacts on safety, speed, costs, passenger levels, and overall customer satisfaction. Aworemi et al. (2008) look at the impact of socio-economic characteristics of formal and informal public transport demand in Kwara State, Nigeria and suggest that government must totally support the informal and formal public transport sectors (private transport companies) by providing well-articulated policies to improve the performance of operations and services. One necessary condition for the realization of quality and the creation of value added is quality measurement and control.

What is BRT?

Bus Rapid Transit uses a variety of innovative system designs and technologies to speed travel time, cut costs and make service more reliable.

Federal Transit Administration defines BRT: “A rapid mode of transportation that can provide the quality of rail trains and the flexibility of buses”

The main elements of BRT are:

1. Physical components:

- Running way
- 1. Dedicated lanes
- 2. Queue Jumps

- Stations: Increased passenger amenities

1. Shelter
2. Benches
3. Way finding
4. System maps
5. Real-time information
6. Off board fare collection etc.

- Intelligent Transportation Systems (ITS)

1. Reduced intersection delay (transit signal priority)
2. Real-time bus arrival notifications

- Branding

1. Unique identity branded to service that is carried through on all aspects of the system including vehicles and stations
2. Operational components

- Service

1. Increased frequencies (minimum every 10 minutes)
2. Increased spans of service (minimum 14 h/day) including nights and weekends
3. Limited stops – only highest ridership locations

- Vehicles

1. Low-floor vehicles to allow curb level boarding
2. Higher capacity vehicles

Measurement of quality service in public sector: SERVQUAL model

The SERVQUAL approach to the measurement of service quality has attracted considerable attention since it was first introduced by Parasuraman et al. in 1985 and further developed by them in 1998 (Donnelly and Dalrymple, 1996). “The approach starts from the assumption that the level of service quality experienced by customers is critically determined by the gap between their expectations of the service and their perceptions of what they actually receive from a specific service provider” (Donnelly and Dalrymple, 1996). The SERVQUAL model proposes five dimensions upon which customers evaluate service quality. These are:

1. Tangibles – the appearance of the physical facilities and materials related to the service
2. Reliability – the ability to perform the service accurately and dependably
3. Responsiveness – the willingness to help customers and provide prompt service
4. Assurance – the competence of the system and its security, credibility and courtesy

5. Empathy – the ease of access, approachability and effort taken to understand customers' requirements.

Initially the SERVQUAL model (Parasuraman et al., 1985) was purported to be a generic model for all service encounters. Work done by Donnelly and Dalrymple (1996) questioned its portability and validity in the case of public services. They contended that the multi-dimensional nature of the stakeholders made the service delivery and evaluation more complex. If SERVQUAL is a generic instrument is it portable to the virtual service encounter that takes place between a call centre and its customers? This paper uses the SERVQUAL Model for measurement of customer satisfaction from establishment of BRT in Tehran.

RESEARCH HYPOTHESES

Main hypothesis

There is a significant relationship between BRT establishment and customer satisfaction of public transportation in Tehran.

Secondary hypotheses

There is significant relationship between variety services of BRT and customer satisfaction.

There is significant relationship between velocity of BRT and customer satisfaction.

There is significant relationship between drivers behavior of BRT and customer satisfaction.

There is significant relationship between ergonomics of BRT and customer satisfaction.

Research conceptual model

We designed a conceptual model based on the research target and its measurement and quality for gaining to target (Figure 1).

RESEARCH METHODOLOGY

This research is applied research and survey-descriptive research. It is used from correlation method for determination relation between customer satisfaction and establishment of BRT. Because of it; we designed and distributed two questionnaires that one SERVQUAL questionnaire is customer satisfaction measurement by SERVQUAL model and another is for BRT passengers. For evaluation of customer satisfaction was stated 15 questions and for BRT passengers were stated 35 questions. For reliability of the research was used Cronbach's alpha and the results of variables reliability are shown in Table 1.

Also, we calculated Cronbach's alpha for all the questions of this research and resulted to 0.879 and this number is higher than 0.7, then the reliability of research is verified. For validity, evaluation

was used from content validity and verification of expert professors and expertise managers in Vahed Company and BRT system.

Based on research hypothesizes can state that independent variables are services quality, speed, drivers behavior, ergonomics and ITS and dependent variable is satisfaction of BRT services quality. Also, are explored and analyzed the relation among customer passenger with services quality, speed, drivers behavior, ergonomics and ITS.

Statistical population and sample

Based on the population of Tehran citizens, target population for BRT passengers in Tehran are 000/000/2 passengers and using the sample size formula 200 passengers were selected. In this research, two questionnaires were distributed, one questionnaire was designed for customer satisfaction measurement (SERVQUAL model) and the second one was designed for BRT passengers. Time scope of the data collection was from September to December 2009.

RESEARCH FINDINGS

For normality testing of variables, the Kolmogorov – Smirnov's test was used. The test results are shown in Table 2. By Pearson's correlation coefficient, the relation among BRT services, drivers' behavior, BRT speed, ergonomics and ITS are verified (Table 3). In Tables 4 and 5, it is given statistics test in Friedman test.

Because error level (0.000) is lower than given error level (0.05), H_0 based on equality of variables priorities is rejected. Thus, the result of Friedman's test shows drivers behavior item with a mean of 1.99 in the first priority, the speed item with a mean of 2.04 in the second priority, Ergonomics item with 2.87 in the third priority, service item of BRT with mean of 3.10 in fourth priority and ITS item of BRT with mean of 3.15 in fifth priority of customer satisfaction. In Table 6, satisfaction of questionnaires respondent sequentially presented drivers behavior, ergonomics, BRT speed, BRT services and ITS.

Conclusions

The research showed that there is a significant relation between BRT establishment and customer satisfaction measurement in Tehran. There is a significant relation between BRT services and customer satisfaction. Therefore, the first of secondary hypothesis is verified. Thus variety services in BRT measured by indexes of fare collection, availability to ticket kiosk, price of ticket, security, clearance, availability to stations and accountability of BRT responsible.

There is a significant relation between BRT speed and customer satisfaction. Therefore, the second of secondary hypothesis is verified. Thus BRT speed was measured by indexes of stoplight number, number of buses, defection of bus and waiting time.

There is a significant relation between driver's behavior and Customer satisfaction. Therefore, the third of secondary

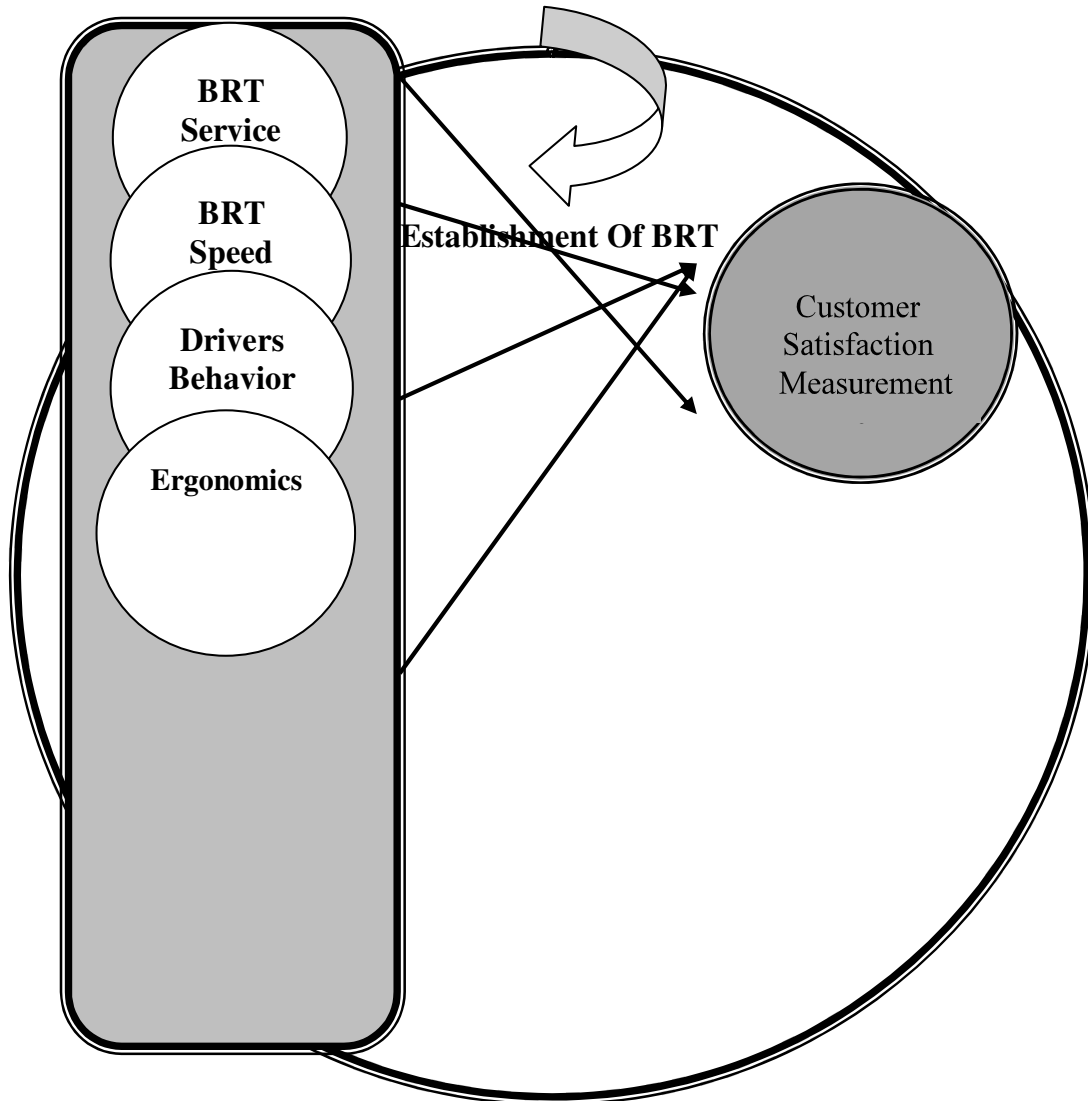


Figure 1. Research conceptual model (Source: Author’s work, 2010).

Table 1. The result of variables research and questionnaire based on Cronbach’s alpha.

Variables	Alpha
Services BRT	0.878
Speed BRT	0.812
Drivers Behavior	0.733
Ergonomics	0.775
Passenger of satisfaction BRT questionnaire	0.713

Table 2. The result of Kolmogorov-Smirnov test.

	Customer satisfaction	Ergonomics	Drivers behavior	BRT Speed	Services BRT
Sig	0.120	0.054	0.334	0.320	0.183

Table 3. Pearson's correlation coefficient for hypothesizes.

Hypothesis	Variables	Pearson's correlation coefficient	P-value
Main hypothesis	BRT establishment customer satisfaction	0.487**	0.000
The first secondary hypothesis	BRT services customer satisfaction	0.438**	0.000
The second secondary hypothesis	BRT speed customer satisfaction	0.403**	0.013
The third secondary hypothesis	Drivers behavior customer satisfaction	0.178*	0.013
The forth secondary hypothesis	Ergonomics customer satisfaction	0.349**	0.000

Table 4. Test statistics in Friedman's test.

Statistics	Score
Number	196
Chi-square	150.236
df	3
Asymp. Sig.	0
Number	196

Table 5. Mean of ranks in Friedman's test.

Variables	Mean of ranks
Services BRT	3.1
Speed BRT	2.04
Drivers behavior	1.99
Ergonomics	2.87

Table 6. Mean and standard deviation of respondents for BRT variables.

Variables	BRT questionnaire (No)	Mean	Standard deviation
Drivers behavior	27-29	4.4	0.9
Ergonomics	30-35	4.2	0.8
Speed BRT	20-26	3.7	0.8
Services BRT	19-Jan	3.6	0.7

hypothesis is verified. Thus driver's behavior in BRT was measured by indexes of treatment of drivers and coverage of drivers (Formal coverage).

There is a significant relation between ergonomics and customer satisfaction. Therefore, the fourth of secondary hypothesis is verified. Thus ergonomics in BRT was measured by indexes of number of bus seats, air condition, the number of catches and convenience of stations. There is a significant relation between ITS and Customer satisfaction. Therefore, the fifth of secondary hypothesis is verified. Thus ITS in BRT was measured by indices of signals priority to drivers and time bus arrival notifications. Mean of customer satisfaction measurement by SERVQUAL model shows sequentially that drivers behavior item, then ergonomics item, then speed item,

then services item and the last, ITS item influence in customer satisfaction measurement.

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