

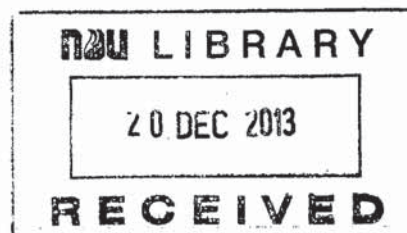
**Notre Dame University  
Faculty of Business Administration & Economics  
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**Public Transit Users versus Private Car Users  
A Study of the Lebanese Perceptions toward Transit  
Services**

**A Thesis Submitted in Partial Fulfillment  
of the Requirements for the Degree  
of the Master of Business Administration  
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**Rania Elie Akiki**

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2013**



Approval Certificate

**Public Transit Users versus Private Car Users  
A Study of the Lebanese Perceptions toward Transit  
Services**

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## **DECLARATION**

I hereby declare that this thesis is entirely my own work and that it has not been submitted as an exercise for a degree at any other University.

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## ABSTRACT

Public transit is considered nowadays a basic mobility service helping people reach their destinations. However, the absence of optimized public transport services in Lebanon and the increased dependency on private cars by the Lebanese are the major concerns of this research study. The key findings indicate that in order to increase public transport usage, the service should be designed in a way that meets the levels of service required by customers and by doing so, attract potential users. The present study investigates the accuracy of perceptions of Lebanese public transport users and private car users toward public transit service quality. A sample of both transit and car users was intercepted in the Beirut region and asked to fill out a questionnaire. Socio-demographic characteristics as well as importance and satisfaction levels toward the different partial criteria of transit service quality dimensions were retrieved and invested in the calculation of the customer satisfaction index. The research findings showed that differences in gender, job sector, monthly income, education, residence, and car ownership influence satisfaction levels towards transit service quality. Besides, Lebanese car users are willing more than ever to decrease their use of private vehicles. Finally, the study is considered as innovative from both an approach and implementation perspective and will guide decision makers in Lebanon to plan long-term strategies and to establish and market viable public transport solutions.

Keywords: public transportation, service quality, commuters' perception, customer satisfaction index, demographic characteristics

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## Chapter 1

### INTRODUCTION

#### 1.1 General background about the topic

Public transportation, also known as public transit, is considered a basic mobility service and its use is growing rapidly in developed as well as in developing countries (Belwal and Belwal, 2010). Nowadays, an urban domain's social, economic, and physical configuration relies mainly on its transportation system as it is considered one of its fundamental constituents (Dridi, 2005). Public transportation incorporates "buses, subways, rails, trolleys, and ferry boats" and omits "school buses and charter and sightseeing services" (Tran and Kleiner, 2005). It is to be noted that public transport services must retain fixed schedules, must be secure and expeditious, must provide high service quality, and most importantly must employ resources in a skilful manner (Dridi et al., 2005). The Federal Transit Administration in the U.S claimed the following: "Every day in the U.S., publicly-funded transportation systems provide approximately 32 million passenger trips. These systems serve commuters, students, tourists, seniors, persons with disabilities, and others who rely on trains, buses, ferries, vans, and other accessible vehicles and facilities to reach their destinations."

Recently, public transit services are focusing mainly on upgrading quality processes and reducing car dependency. In general, service quality can be determined through the way customers perceive those services including their outlooks, suppositions, beliefs, and assumptions. Besides, customers' satisfaction and customers' attitude may contribute majorly in measuring the service quality as well (Sachdev and Verma, 2004). Furthermore, the Transit Cooperative Research Plan defines transit quality as "the overall measured or perceived performance of transit measured from the passenger's point of view". Johns (1992) considers that the sum of customers' perceptions and experience form the service quality. According to Disney (1998), "reliability, frequency, friendliness of services, cleanliness of interiors and exteriors, comfort, ease of access,

reasonable fares, and easy-to-understand timetables were found at the top of positive reasons for utilizing bus services in the UK.” Therefore, the marketing of a product and its consequent acceptance and acquisition is never independent of consumers’ perceptions (Belwal and Belwal, 2010).

However, the frequency of service, for example, is one of the features that can clearly and easily describe transit services compared to customer tastes and preferences such as comfort and ease of access, and which are more difficult to determine and measure (Eboli and Mazulla, 2009).

Public transportation services in Lebanon are few. There is no city-operated fixed-route bus service. More specifically, Beirut, the capital and the largest city of Lebanon, still suffers from the shortage of competent transport services (Newman and Kenworthy, 1999). Located at the halfway point of Lebanon’s Mediterranean coastline, Beirut contributes majorly to the economy through its services, commerce and tourism (Lebanese Embassy Washington DC, 2002). The exact Beirut population is unknown, ranging from more than 1 million to a bit less than 2 million, needless to mention the large number of people who get in and out of Beirut everyday for different kinds of trips (Wikipedia, 2007). Both the citizens and the foreigners depend more on privately owned and operated transportation means to reach particular spots and in some cases have to engage in two or more different rides in order to reach the desired destination (Newman and Kenworthy, 1999).

The major concern of the study is the absence of optimized public transport services in Lebanon and the increased dependency on private cars by the Lebanese citizens. Corpuz (2007) suggests that by examining the attitudes and perceptions of different social categories towards public transport services, decision makers will be able to find the appropriate solutions for what he calls “the public inertia”. To summarize, customers will utilize public transport services in case the latter were designed in a way that matches their perceptions and needs (Beirao and Cabral, 2007). The study will help reveal public transit users’ and car users’ perceptions and attitudes regarding public

transportation. It will also determine satisfaction and importance levels regarding the different attributes of service quality, and will give some notions about the facilitators and obstacles to the implementation of efficient public transport services.

## 1.2 Need for the study

People's preferences in using the private vehicle are increasing. Most of them are now highly dependent on private cars (Ellaway et al., 2003). In addition to congestion, private motorization affects "the safety of vulnerable road users" (Kodukula, 2009)," leading to "high consumption of non-renewable resources" (Aßmann & Sieber 2005), and finally threatening "the quality of human environments" (Goodwin, 1996; Greene & Wegener, 1997).

Service quality is an important circumstance that affects transit behavior. If people had bad experiences with transit, they will form negative perceptions and consequently will avoid considering it as an option (Eboli and Mazzulla, 2009). On the other hand, adequate service quality affects consumer behavior positively and results in higher returns (Zahorik & Rust 1992; Boulding, Kalra, Staelin, & Zeithaml, 1993; Zeithaml, Berry, & Parasuraman, 1996; Liu, Sudharshan, & Hamer, 2000). The importance of the research lies on the ability to detect the weakest dimensions of the transit service from the people's point of view. The research will detect whether improvements of those weak attributes will help retain current users and attract new ones eventually.

The World Economic Forum's Arab World Competitiveness Report for 2006 and 2007 identifies four macroeconomic elements that make an effective transport service a strategic necessity: "the enhancement of economic activity, the enhancement of industry competitiveness, the growth of the industry sector, and the generation of sustainable job opportunities."

Thus, the study has an innovative aspect and can stimulate decision makers in the Beirut region to think of the long-term and consequently strive for providing and

marketing viable and competitive transportation alternatives for the benefit of the city and its people. This may help solve at least some of Beirut's problems such as traffic congestion, low mobility, high individual expenditure on transport, and high frustration due to prolonged waiting periods (Eboli and Mazzulla, 2009).

### 1.3 Purpose of the study

The objective of the research is to study the influence of socio-demographic factors such as gender, age, income, work status, marital status, residence, education, car ownership, driving license availability, and availability of public transit on the Lebanese people's attitudes toward public transport services. Socio-demographic factors alone are considered as "poor proxies" in what concerns understanding the underlying behavioral and attitudinal characteristics of individuals toward transport modes (Chorus et al., 2006a). That's why, availability, access, information, safety, time, customer service, comfort, and environment are the major quality criteria that will be studied as well. The measurement of the importance and satisfaction rates regarding each of the partial criteria will assist in detecting Lebanese people's perceptions toward transport service quality.

Therefore, the research will help determine people's attitudes toward public transport services. Moreover, the study will focus on the main factors pushing people towards preferring a particular mode over the other. Thus, this thesis will contribute in generating an idea on whether the Lebanese are willing to decrease their dependency on private cars in case well established public services that meet their perceptions are implemented.

### 1.4 Brief overview of all chapters

The thesis is structured in a way that the current chapter provides general knowledge about the topic; it briefly defines public transportation and its link to people's perceptions of service quality and discusses the need and importance of the study while giving clues to how the research will be conducted. The next chapter overviews

previously published literature on the topic which will mainly contribute to revealing the research questions. Besides, chapter three consists of the procedures and methodology applied in testing the formulated hypothesis followed by chapter four that exposes the findings of the research and determines whether the hypotheses are accepted or not. Finally, chapter five concludes the results and clarifies the limitations and the managerial implications of this study.

## Chapter 2

### REVIEW OF LITERATURE

#### 2.1 Inefficient public transportation

##### 2.1.1 Consequences of increased car dependency

Uneconomical public transportation has been dominating Lebanon for around 20 years (Berro, 2011). In many cases, the Lebanese rely on private cars to reach employment, medical care, educational services, and different community resources (CH2MHILL, 2002). In other terms, they are becoming more and more addicted to the culture of automobile use. Thus, cars are becoming “mass consumer goods” in Lebanon (Perry, 2000). The number of private cars has increased by 538 percent from the year 1974 to the year 1998 (World Bank, 1999). The previously mentioned numbers are alarming especially when it comes to the negative impacts of automobile dependency on the environmental, socio-economic and health levels. Perry (2000) discusses thoroughly the negative impacts of excessive car use in Lebanon: “Car dependency in Lebanon drains the national economy of wealth and natural resources, encourages the reduction of the quality and quantity of public social space in cities, creates sprawl and far-flung suburbanization, and destroys culture. It is quickly becoming recognized as a global, social, and environmental problem.”

In the United States, the constant reliance on cars and other unshared means of transport has social and economic burdens, such as “the costs of health problems and accidents, heavy government subsidization of roadway construction and maintenance and of gas consumption, excessive land consumption, environmental pollution, lost labor and productivity due to traffic jams, net reduction of employment opportunities, and higher costs of living” (Newman and Kenworthy, 1999; Kay, 1997). The negative influence of car dependency is more harmful in Lebanon than in the U.S., since all resources are imported (Schneider-Sickert, 1997).





Furthermore, buses, vans and other resembling means of transport, public and private, seized 1.3 per cent at most of all person expeditions in the Beirut region in the year 1994. Two following studies in 1998 and 1999 estimated that passenger trips relying on automobiles constituted 83 per cent and 90 per cent respectively of all passenger trips (Meymerie, 1999; Najia, 1995; Baaj, 1999, 9; Nakkash, 1999). Thus, the number of Lebanese people relying on private cars is increasing year after year. The previously mentioned statistics guide the way towards questioning people's attitudes on public transportation in order to detect their perceptions toward each dimension of the service quality.

#### 2.1.2 The case of public transportation in Lebanon

Currently, the three modes of public transportation that are functioning in Lebanon are the buses, the mini-buses and the "service" (the local name for collective taxis). The latter is managed by the Office des Chemins de Fer et des Transports en Commun (OCFTC), or the "*Railway and Public Transportation Authority*" in English. It is important to mention that the rail transport in Lebanon has ceased at the end of the 20<sup>th</sup> century as a result of political difficulties.

The first bus station is known as "the AlSayyad" Roundabout and is located at Hazmieh; Buses at that station carry passengers up to the Beqaa region. The second one is the "Cola" bus station for buses heading to Sidon and Tyre. The third bus station is the "Charles Helou" station facing Beirut port, and is mainly a stop for buses setting out to northern destinations, mainly Tripoli.

The mini-buses and the "service" have neither definite stations nor specific schedules; People flag down drivers at any point in the street to take a ride and consequently verify with them the targeted destination in order to avoid misunderstanding. Sometimes, it is the case of the buses as well (Travel to Lebanon, 2011).

### 2.1.3 Conclusion

In 2008, an RAC report on motoring claimed the following: “Today, society and the lives we lead are increasingly organized around the assumption of having access to a car...” This might be the case of the Lebanese people who are used and convinced to drive their own cars on a daily basis. The latter are influenced by several factors that are even preventing them from thinking about public transportation. Therefore, a suitable analysis of the Lebanese car and transit users’ perceptions of public transport services will contribute in detecting their attitudes and readiness towards endorsing public transport (Belwal and Belwal, 2010).

## 2.2 Previous research

### 2.2.1 Service quality and transit behavior

Public transport can attract more travelers in case its services are created in a way that accommodates the level of service required by customers (Hensher, 1998; Beirao and Cabral, 2007). Service quality has become lately a “significant differentiator and the most powerful competitive weapon” that helps add value to service offerings (Clow & Vorhies, 1993; Rust & Oliver, 2002). Besides, attitudes towards public transport and beliefs on whether it is able to fulfill people’s needs greatly influence transit behavior (Thogersen, 2006). Therefore transit behavior is directly related to people’s attitudes and preferences (Kuppam, Pendyala et al., 1999; Golob, 2003; Parkany, Gallagher et al., 2004). It is widely known that customers constantly compare perceived services with expected services; their expectations derive mainly from former experiences, word of mouth, and publicity (Parasuraman et al., 1998). Even though travelers’ demand is majorly dominated by service quality (Prioni and Hensher, 2000), it is never expected that all car users will shift to public transport in case its services were ameliorated (Jensen, 1999).

Internal and external factors affecting people’s perceptions toward public transport services altogether form the public transportation service quality system (Middleton,

1998). Demographic characteristics are important attributes as well to measure service quality and to obtain service performance ratings (Kumar and Lim, 2008).

Factors that affect transit ridership, according to criteria by Taylor et. al (2002) and Transport and Travel Research Limited and European Commission (TTRL & EC) (1996), are classified into three categories:

- External factors that directly influence transit travel demand such as physical geography and population demographics
- Indirect measures that are somehow independent of local governments and public transit agencies such as land use freeway plans
- Direct measures are policy factors that are considered as internal to public transit agencies such as service frequencies and fare levels

The following table consists of a detailed description of direct and indirect measures.

<p style="text-align: center;"><b>INDIRECT MEASURES</b></p> <p style="text-align: center;">Improving the competitive position of public transport</p>	<p><b>CAR OWNERSHIP</b></p> <ul style="list-style-type: none"> <li>Taxation of car ownership</li> <li>Restrictions on car ownership</li> <li>Road pricing</li> </ul> <p><b>CAR USE (AREA SPECIFIC)</b></p> <ul style="list-style-type: none"> <li>Traffic calming</li> <li>Access restrictions</li> <li>Car vehicle specification</li> </ul> <p><b>CAR USE (GENERAL)</b></p> <ul style="list-style-type: none"> <li>Fuel tax</li> <li>Restrictions on car use</li> </ul> <p><b>OTHER</b></p> <ul style="list-style-type: none"> <li>Information on traffic conditions</li> <li>Land-use planning</li> <li>Tele-conferencing / tele-shopping</li> <li>Flexible working hours</li> <li>Increase in road capacity</li> <li>Improvements to non-motorised modes</li> </ul>
<p style="text-align: center;"><b>DIRECT MEASURES</b></p> <p style="text-align: center;">How to improve the offer of public transport</p>	<p><b>PRICING</b></p> <ul style="list-style-type: none"> <li>Fare levels</li> <li>Ticketing regimes/fare structure</li> <li>Ticketing technology</li> <li>Subsidy regime</li> <li>Fleet size</li> </ul> <p><b>SERVICE PATTERN</b></p> <ul style="list-style-type: none"> <li>Extensiveness of routes</li> <li>Distance to/from stops</li> <li>Service frequency/leaved time</li> <li>Operating hours</li> </ul> <p><b>SERVICE QUALITY</b></p> <ul style="list-style-type: none"> <li>Vehicle characteristics</li> <li>Bus/stop quality</li> <li>Interchange quality</li> <li>Quality/Number of staff</li> </ul> <p><b>PRIORITY MEASURES</b></p> <ul style="list-style-type: none"> <li>Link priority/right-of-way</li> <li>Junction priority</li> <li>Quality regulations</li> </ul> <p><b>REGULATORY REGIME</b></p> <ul style="list-style-type: none"> <li>Market regulation</li> <li>Operational regulations</li> </ul> <p><b>INFORMATION</b></p> <ul style="list-style-type: none"> <li>Information provision</li> <li>Publicity/promotion</li> </ul> <p><b>OTHER</b></p> <ul style="list-style-type: none"> <li>Park-and-ride</li> <li>Integrated approach</li> </ul>

Table 2.1: Direct and Indirect Factors Affecting Transit Ridership  
Taylor et. al (2002) and TTRC & EC (1996)

Transit service quality indicators can be identified as operational and physical (Eboli, L. and Mazzulla, G., 2011); Operational indicators are related mainly to users' satisfaction towards the different transit service attributes. Whereas physical indicators are used by operators and local authorities and are involved in measuring and evaluating the design features of service attributes (Dell'Olio, L., Ibeas, A., Cecin, P., 2011; Eboli, L. and Mazzulla, G., 2011; Sheth, C., Triantis, K., Teodorovic, D., 2007; Foote, P.J., Stuart, D.G., 1998). The following table shows the range of indicators available in literature with their corresponding sources:

Author	Source	No.Indicators
Eboli and Mazzulla [8]	A methodology for evaluating transit service quality based on subjective and objective measures from the passenger's point of view	13
Dell'Olivo et al, [6]	Modelling user perception of bus transit quality	6
Dell'Olivo et al,[1]	The quality of service desired by public transport	10
Lia and Chin [5]	Behavioural intentions of public transit passengers - The roles of service quality, perceived value, satisfaction and involvement	18
Iseki and Taylor [2]	Style versus Service? An Analysis of User Perceptions of Transit Stops and Stations	16
Nathanail [7]	Measuring the quality of service for passengers on the Hellenic railways	10
Tyrinopoulos and Antoniou [3]	Public transit user satisfaction: Variability and policy implications	23
Ceder [23]	Public Transit Planning and Operation Theory, modelling and practice	26
Friman [11]	Implementing quality improvements in public transport	13
Hensher [22]	Service quality—developing a service quality index in the provision of commercial bus contracts.	13
(CEN [4]	Transportation – Logistics and services – public passenger transport – service quality definition, targeting and measurement	103
TRB [10]	Transportation Research Board; a handbook for measuring customer satisfaction and service quality.	48
DfT Annual survey	User satisfaction annual survey (Department for transport, London, UK)	11

Table 2.2: The Wide Range of Quality Indicators Available in the Literature (Mahmoud, 2011)

### 2.2.2 Service quality criteria in Istanbul

The Service Quality Management System was established for the Levent Metro Line in Istanbul in order to offer high quality services and meet passengers' requirements and expectations. The following table shows the determinants and quality criteria for the Metro Line.

<b>Determinants</b>	<b>Quality Criteria</b>
<b>Availability</b>	Availability of escalators, lifts and moving walkways (travelators)
	Availability of ticket machines
	Availability of validation devices
<b>Information</b>	Permanent information in stations
	Permanent information in trains
	Client information in case of planned traffic disturbance
<b>Time</b>	Waiting for trains
<b>Comfort</b>	Cleanliness and neatness of metro stations
	Cleanliness and neatness of trains
	Passengers comfort in trains
	Passengers comfort in trains during the off-peak hours
<b>Customer Care</b>	Reception and information in station on the offer of services
	Contact centre
	Web site
	Replying written complaints
<b>Security</b>	Fight against Fare-dodging

Table 2.3: Determinants and Quality Criteria

(Bozbura, et. al., 2010)

### 2.2.3 Perceptions on public transport

#### 2.2.3.1 Perceptions toward public transport in Indonesia

A study was performed in Indonesia in order to explore the impacts of individual attitudes and past experiences toward public transport. Interview and travel diary surveys among public transport users were performed in three different metropolitan regions in Indonesia: Jakarta, Bandung and Jogjakarta. The following table represents the reasons that pushed travelers to the use and the non-use of public transport along with the percentages:

	Jakarta (%)	Bandung (%)	Jogjakarta (%)
<b>Reasons to use public transport:</b>			
1. Do not have own private vehicle	38.9	40.3	42.2
2. Cheaper than other mode	18.8	13	14.7
3. Easy to use	9.6	7.3	6
4. Easy to find	7.4	10.7	6.2
5. Faster than other mode	4.2	1	2
6. Practicality	14.8	16.6	15.9
7. Other	6.2	11.1	13.1
<b>Reasons not to use public transport:</b>			
1. The weather/environment conditions (raining, late night, etc.)	31	40.5	32.7
2. The conditions of public transport operation/fleet (overcrowded, operating hour	31.8	25.5	32.9
3. Traffic condition (congestion)	24.5	21	10.2
4. Other	12.7	13	24.1

Table 2.4: Reasons to or not to use Public Transport  
(Susilo and Joewono , 2009)

#### 2.2.3.2 Perceptions of safety on public transport

Several research studies show that psychological factors are at the basis of creating perceptions of unsafety on public transportation. People's fear is related to unpredictability, lack of knowledge on other travelers and invasion of personal space (Brantingham et al., 1991; Thomas, 2009).

In a research (Currie et al., 2010) aiming to explore particularly the perceptions of safety on public transport in Melbourne, young people were asked the following question: "How safe do u feel?"



The resulting answers show that over 40% of young people felt unsafe or even very unsafe while using public transport at night. Waiting at or travelling to/from train stops were the next most common fears, followed by waiting at bus stops. Using public transport during the day was the least common concern since 90% of respondents expressed their feelings of safety; some of them even felt very safe.

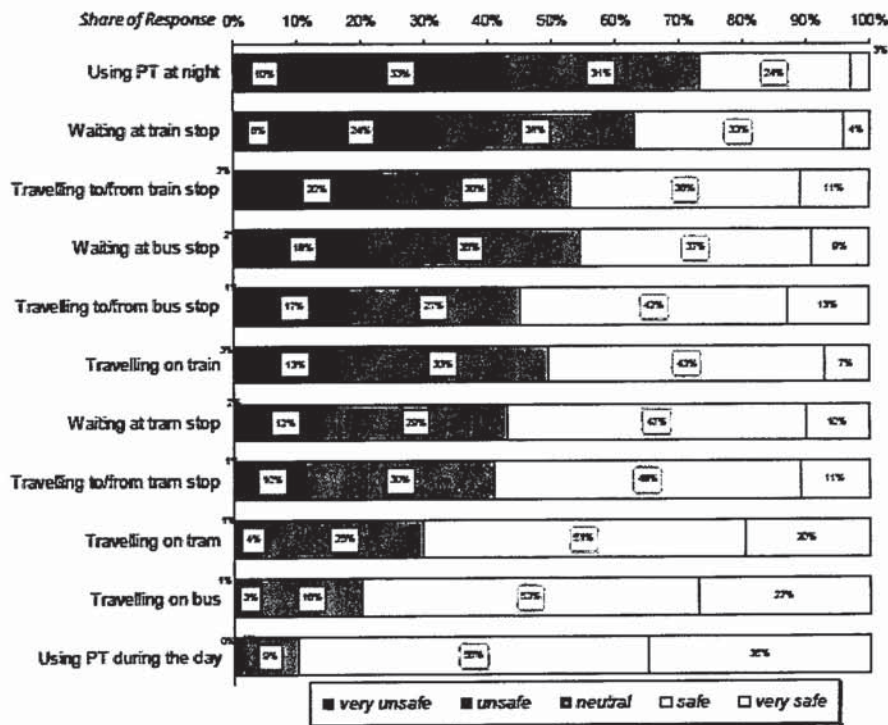


Figure 2.2: How Safe Do You Feel...  
(Currie, G., Delbosc, A., & Mahmoud, S., 2010)

### 2.2.3.3 Perceptions of comfort on public transport

Johansson (1989) defines comfort in public transport as; “The level of a person’s experienced well-being during a trip.” He also divides comfort into the following three parts; comfort during boarding/alighting, comfort when changing transport mean and comfort during the trip. Any trip can become more attractive if it offers comfort to its riders. Thus, it is an important factor of transit service quality that cannot be neglected (Sandow & Westin, 2007).

## 2.2.4 Car users' profile

### 2.2.4.1 The six categories of car users

While investigating car users' attitudes toward public transport, Anable (2005) discovered that some people are more willing to change their transport modes than others and thus, classified the respondents of her questionnaire into six categories.



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Transport Profile	Description
<b>Die Hard Driver</b>	Fond of cars and car travel, believe in the right to drive cheaply and freely and have negative feelings towards all other travel modes
<b>Complacent Car Addict</b>	Admit the use of alternative modes is possible but do not feel any moral imperative or other incentive to alter their car use
<b>Malcontented Motorist</b>	Perceive higher constraints to the use of public transport despite feeling increasingly frustrated with car travel and believing they have a moral responsibility to change behaviour
<b>Car-Less Crusador</b>	Sacrificed car ownership for environmental reasons and have positive evaluations of all other modes
<b>Reluctant Rider</b>	Involuntary users of public transport due to health or financial reasons who would prefer to travel by car and aspire to own a car in the future
<b>Aspiring Environmentalist</b>	Already reduced their car use largely for environmental and health reasons but appreciate the practical advantages of car travel and are reluctant to give up ownership entirely

Table 2.5: Transport User Profiles

(Anable, 2005)

The “Malcontented Motorists” seem to be more ready to change their transport behaviour than the “Die Hard Drivers” for example who actually don’t even consider public transport an option.

#### 2.2.4.2 Other studies on car users' profile

(Boarnet & Sarmiento, 1998) and (Cao *et al.*, 2006) suggest that residents of the “new urbanist” area are more environment friendly and thus are more willing to consider public transport modes in order to reach their destination. On the other hand, (Kropman and Katteler, 1990) found out that only one out of six “morning peak-period” car drivers perceived public transport as an alternative although 83% of the sample had the possibility to use public transport. The authors considered that people’s perceptions of travel cost and time are preventing them from utilizing public transport. However, awareness towards the choice of the most suitable transport mode is increasing especially among drivers highly dependent on their cars (Garvill *et.al.*, 2003). Knowing that perceptions can be changed, it is recommended to make the car seem less attractive at first, and then to increase knowledge on the existing alternative modes of transport in order to help people reduce car use (Handy *et al.*, 2005).

In-depths interviews were conducted in Scotland on a sample of car owners and non-car owners in order to investigate the psycho-social factors that people retrieve from the use of their cars and which they perceive as benefits. It was deduced that people found out cars more convenient, reliable, and accessible. Besides, cars provided prestige and other socially desirable attributes to their drivers (Hiscock *et al.*, 2002). Similar research has also discussed thoroughly the feelings derived from the use of the private car such as personal freedom, joy and security (Steg *et al.*, 2001). Tardiff (1976) studied the attitudes and perceptions driving people to a certain transport mode in the Santa Monica and Los Angeles, California regions and discovered that the convenience and the privacy of a private automobile were the top two reasons capable of explaining increased car dependency.

#### 2.2.5 Factors affecting transit ridership

A statistical descriptive analysis has been performed in a research study to determine the factors leading to the non-use of transport services by the students of the University of Calibria. 39.8% of the sample considered the low service frequency a major factor

preventing them from using public transport. The second non-use reason was the overcrowding chosen by 15.9% of the respondents, followed by the slowness of the vehicle (12.5%) as the third chosen factor (Eboli and Mazzulla, 2006). The results are displayed in the following diagram:

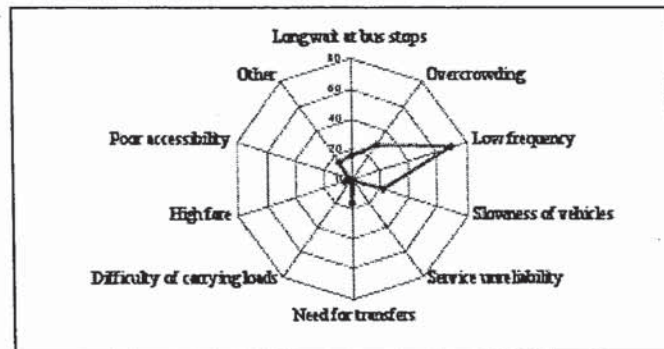


Figure 2.3: Statistical Analysis for Public Transport Non-Use Reasons (Eboli and Mazzulla, 2006)

A statistical-descriptive analysis of public transport use reasons was accomplished as well knowing that 220 out of 382 sampled students were not residents of the urban area. 45.4% of respondents considered that service inexpensiveness was the main reason pushing them towards using public transport followed by the practicality of the trip which was chosen by 36.1% of all consumers as they considered it less tiring than that of the car. The third use reason was the risk reduction of road accidents when utilizing shared passenger transportation systems and which was chosen by 10.1% of consumers.

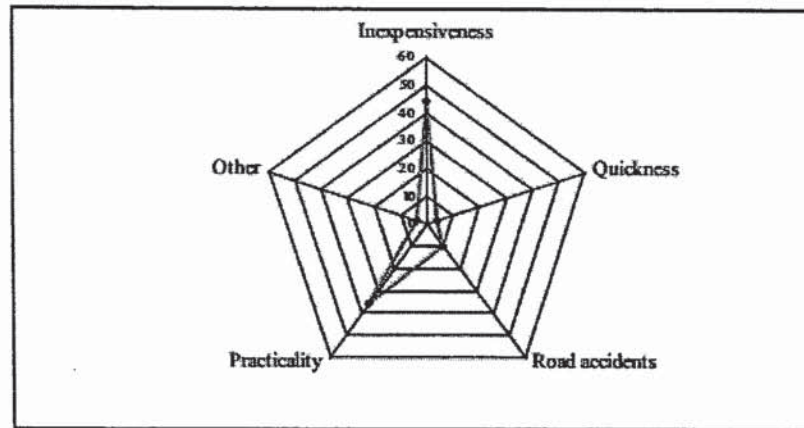


Figure 2.4: Statistical Analysis for Public Transport Use Reasons  
(Eboli and Mazzulla, 2006)

On the other hand, Kittleson & Associates (2003a) discussed the following factors affecting transit riders:

Factors	Using These Factors To Increase Ridership And Benefits
Convenience	Increase transit service coverage and frequency.
Information	Provide information on where, when and how to use transit.
Price	Keep fares low and offer targeted discounts, such as commuter passes.
Speed	Provide express commuter services and transit priority measures.
Accessibility	Develop more accessible land use patterns and more diverse transportation systems.
Integration	Provide park & ride facilities, transit service to major transportation terminals.
Comfort	Provide adequate service so transit vehicles are not crowded.
Security	Insure that transit vehicles, facilities and service areas are considered secure.
Prestige	Treat transit riders with respect, and promote transit as a desirable travel option.

Table 2.6: Factors Affecting Transit Ridership  
(Kittleson and Associates, 2003)

The “Victoria Transport Policy Institute” investigated the value passengers place on transit service quality. The following factors were considered as strictly essential for its analysis.

Category	Service Quality Objectives
Coverage	The walk to and from transit stops is a reasonable distance. The route network operates in very close proximity to major destinations.
Comfort	The waiting areas at bus stops are clean, attractive, well-lit and accessible. Transit shelters are placed at busy and/or exposed stops. Transit shelters are well-maintained. Modern accessible buses in good repair are used to provide service. Bus interiors and exteriors are clean and well-maintained. Buses are operated safely.
Travel speed	Buses operate at frequent intervals. Routes are direct. Buses are not delayed by traffic and parked cars. Transit priority measures are used to speed up bus service. Transit travel times are competitive with automobile travel.
Reliability	All scheduled trips are operated. Vehicle breakdowns are minimized. The service operates on time. Transfer connections are made. Transit priority measures are used to eliminate schedule delays.
Convenience	A network of well-maintained sidewalks provides access to transit stops. Stop platforms and shelters are well designed and maintained in good repair. Accessible buses are used to provide service. Service schedules identify the trips operated by accessible buses. High quality snow removal on sidewalks allows wheelchair access to regular transit.
Courtesy	Passengers are treated politely and respectfully by transit staff. Staff provide reliable information to customers. Complaints are investigated promptly and corrective action is taken.
Amenities	Transit offers amenities such as washrooms, on-board wireless services, and refreshments, particularly for longer-distance trips.

Table 2.7: Transit Service Quality Objectives

(Litman, 2011)

## 2.2.6 Applications in public transport

### 2.2.6.1 SEM application in public transport

The structural equation model is a multivariate technique that combines regression, factor analysis, and analysis of variance to assess interrelated dependence relationships simultaneously. SEMs are generally composed of two modules: the first illustrates the connection between endogenous and exogenous latent variables whereas the second details the interdependence between latent and observed variables (Bollen, 1989).

The SEM model was applied in a study aiming to investigate the effects of transit aspects on global customer satisfaction (Andreassen, 1995; Karlaftis et al. 2001). The



bus service analysis was that of University of Calabria students coming from the urban area of Cosenza.

A total of 763 students were interviewed. Information about respondents' socioeconomic characteristics and bus service quality perceptions were retrieved. On a scale from 1 to 10, students expressed a rate of importance and a rate of satisfaction regarding each of the below mentioned 16 attributes of transit services. Besides, a rate on global service, in terms of both expected and perceived quality, was requested.

<b>Attribute</b>	<b>Description</b>
Bus stop availability	Availability of bus stop near home
Route characteristics	Route characteristics (number of bus stops, distance between bus stops, etc.)
Frequency	Service frequency
Reliability	Reliability of buses that come on schedule
Bus stop furniture	Availability of shelter and benches at bus stops
Overcrowding	Bus overcrowding
Cleanliness	Cleanliness of interior, seats, and windows
Cost	Cost affordability
Information	Availability of schedule/maps at bus stops
Promotion	Availability of service information by phone, mail, Internet, etc.
Safety on board	Vehicle reliability and competence of drivers
Personal security	Safety against crimes on buses
Personnel	Helpfulness of personnel
Complaints	Administration of complaints
Environmental protection	Use of ecological vehicles
Bus stop maintenance	Physical condition of bus stops

Table 2.8: Service Quality Attributes

(Eboli and Mazzula, 2007)

One of the major limitations of the study was the application of SEM in a survey addressing a single category and not all categories of transit users.

### 2.2.6.2 SERVQUAL application in public transport

SERVQUAL, developed by (Parasuraman et al., 1988), was administered to measure commuters' perception on service quality using a 5 point Likert scale in the twin cities of Hyderabad and Secunderabad, India. The index is calculated through the difference between perception and expectation rates for each of the attributes. The study insisted on the extension of generic SERVQUAL dimensions with an additional dimension "culture" in order to properly represent the study context. At the end, it was concluded that public transport services delivered meet commuters' expectations in what concerns service quality.

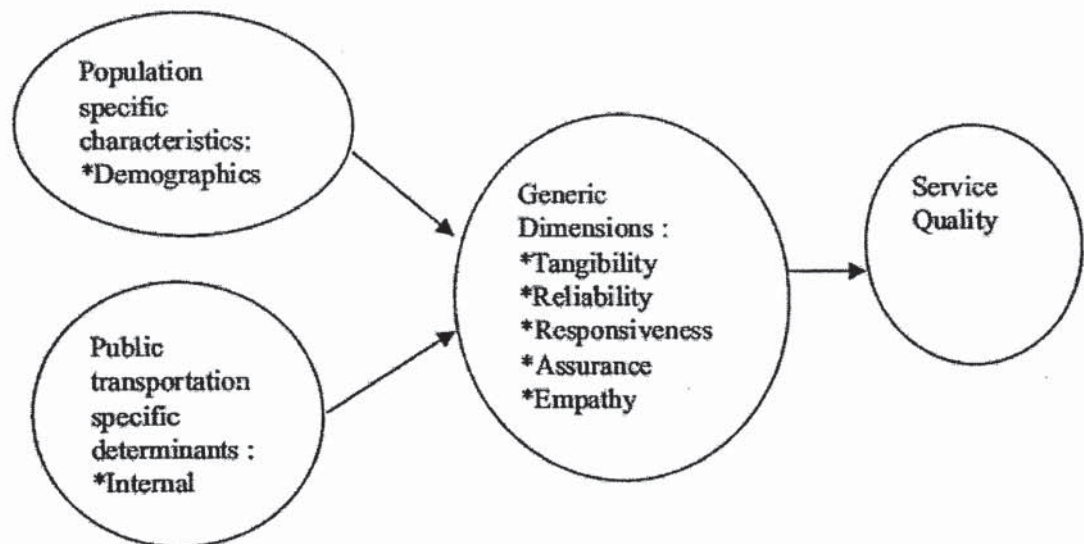


Figure 2.5: Framework for Measuring Service Quality in Public Transportation  
(Parasuraman et al., 1988)

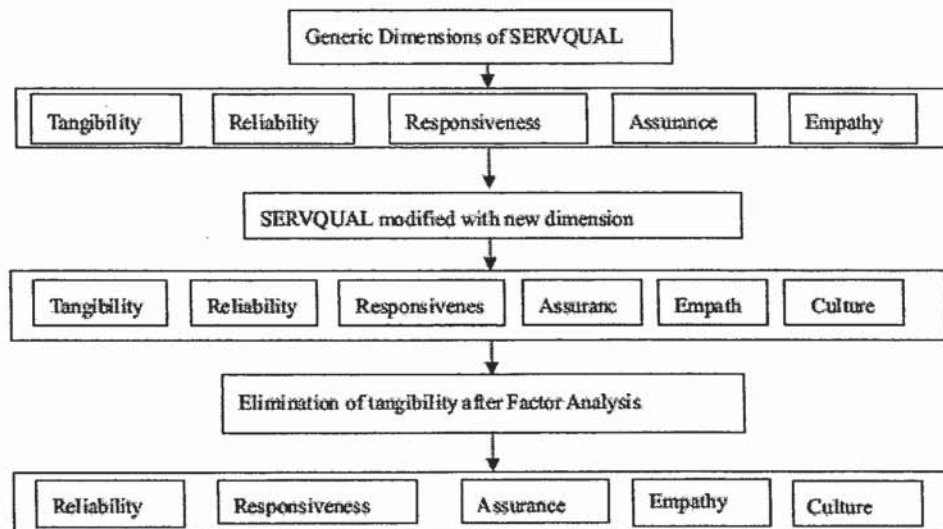


Figure 2.6: Model Depicting the Present Study  
(Randheer et al, 2011)

#### 2.2.6.3 SQI application in public transport

The service quality index or SQI is a recently used index that allows transit users to choose between the service habitually used and hypothetical services determined by stated preferences (SP) techniques. SQI helps users express indirectly their levels of satisfaction and importance. An example on the previously mentioned is a case study conducted by “Marcucci” in five geographical areas of the Marche, a region in central Italy. Respondents were asked to reveal their socioeconomic characteristics and to provide information about their current trip or in other terms, the revealed preference (RP). Next, the interviewee had to make repeated choices between three alternatives, his current trip and two other hypothetical trips known as the SP data.

### 2.3 Conclusion

In previous studies on public transportation in Lebanon, researchers have focused on studying the best way to structure the Lebanese railway and public transport authority, the different national land transport strategy options, the consequences of

pollution and traffic congestion... However, none of them has investigated the variables that affect Lebanese travelers' opinions, choices and behavior or even studied the type of services that are important to them leading to their greater satisfaction. Hence, it is still a virgin area to investigate.

This research study is going to discuss thoroughly the preceding through employing socio-demographic factors and other independent factors. It is important to mention also that consumers' perceptions of the service quality majorly affect their satisfaction and behavioral intentions (Dodds et al., 1985; Zeithaml, 1988; Lee and Cunningham, 1996; Oh, 1999). That's why importance and satisfaction levels toward each factor are going to be measured in order to determine the Lebanese attitudes of transport service quality. Nowadays, the latter is considered as the most important aspect of transportation services and it can never be neglected in marketing such services (Ancarani & Capaldo, 2001).

## Chapter 3

### PROCEDURES AND METHODOLOGY

#### 3.1 Introduction

Nowadays, the need for rational transport systems in Lebanon is becoming more indispensable in order to preserve resources on one hand and to reduce environmental impacts on the other. Lebanese people will be stimulated to employ public transit consistently only when the levels of service comply with their expectations. That's why, it is mandatory to find out riders' demographic characteristics and perceptions toward transit services in order to find out what really affects their mode choices so that future improvements will be employed properly. The current chapter will explain all the details of the procedures and methodology applied.

#### 3.2 Research questions

The research questions that are going to be discussed throughout the chapters are the following:

- What is the perception of the Lebanese toward public transport services?
- What are the major service quality factors affecting their opinions, choices and behavior?
- Do demographic differences influence satisfaction and importance levels?
- Does the improvement of transit's weak attributes help decrease the Lebanese citizens' dependency on private cars?

#### 3.3 Hypotheses

The previously discussed research questions, at the end of chapter 2, are formulated into the following hypotheses:

H0: Demographic differences among the Lebanese don't influence their satisfaction towards transit service quality.

H1: Demographic differences among the Lebanese influence their satisfaction towards transit service quality.

### 3.4 Selected variables

This study examines the effect of demographic and other variables, as listed below, on the consumer satisfaction index.

#### 3.4.1 The independent variables

##### -Demographic Variables

- Gender (Black and Nijkamp, 2002)
- Age (Black and Nijkamp, 2002)
- Income (Beirao and Cabral, 2007)
- Work status (Beirao and Cabral, 2007)
- Marital status (Beirao and Cabral, 2007)
- Education (Beirao and Cabral, 2007)
- Residence (Belwal and Belwal, 2010)
- Car ownership (Thogersen, 2006)
- Driving license availability (Beirao and Cabral, 2007)

##### -Other Variables

- Availability of public transit: tickets procurement, link to other transport systems, availability of validation (Stafford, 1999)
- Time: accuracy of arrivals/departures, travel time (Eboli and Mazzulla, 2007)
- Environment: used energy source, emission class, vehicle noise, odor and dust production (Eboli and Mazzulla, 2007; Swanson et, al., 1997; Tyrinopoulos and Antoniou, 2008; Iseki and Taylor, 2008; Joewano and Kubato, 2007)

- Information: availability of services, customer care, travel fees, sign at stops (Friman et.al., 2001; Tyrinopoulos and Antoniou, 2008; Iseki and Taylor, 2008; Joewano and Kubato, 2007)
- Safety: driving style, lighting, monitoring of area, ride elements, supervision of policeman/driver (Smith and Clarke, 2000; Fellesson and Friman, 2008; Tyrinopoulos and Antoniou, 2008; Iseki and Taylor, 2008; Joewano and Kubato, 2007)
- Comfort: protection against weather, vehicle noise at the stop, stop cleanliness, vehicle cleanliness, crowding, style of starting off/braking, hygiene services, temperature inside vehicle, availability of seats, design of seats and leg space (Eboli and Mazzulla, 2007; Swanson et al., 1997; Tyrinopoulos and Antoniou, 2008; Iseki and Taylor, 2008; Joewano and Kubato, 2007; Anderson and Stradling, 2004; Vuchic, 2005; Kottenhoff, 1999)
- Customer service: addressing complaints/suggestions, answering questions, marketing, personnel access (Parasuraman et al., 1998)
- Accessibility: geographic accessibility, schedule flexibility, frequency of services, disabled specialized services, reliability (Smith and Clarke, 2000; Fellesson and Friman, 2008; Tyrinopoulos and Antoniou, 2008; Iseki and Taylor, 2008; Joewano and Kubato, 2007; Holmberg and Hyden, 1996)

#### 3.4.2 The dependent variable

The customer satisfaction index known as “CSI”

### 3.5 Methodology

#### 3.5.1 Test the above hypotheses

“Research is a process of enquiry and discovery” that studies relationships between “humans, space, place, and the environment” (Kitchen and Tate, 2000). In this case, the purpose of the research is to study public’s perceptions towards public transport services in Beirut (Beirao and Cabral, 2007).

Qualitative survey techniques play an indispensable role in the exploratory research that is in determining and affirming the factors that influence transport behavior (Amadeo et al., 1997). Quantitative research methods, on the other hand, support the descriptive research and contribute to establishing quantifiable conclusions (Flowerdew and Martin, 1997). The latter will assist in determining the characteristics and attitudes of transit and car users, the degree to which variables are associated and will help out in putting up the analyses and the predictions in order to make the right decisions. Qualitative methods cannot replace quantitative methods; Both methods complement each other (Clifton and Handy, 2003; Poulenez-Donovan et. al., 1994). Therefore, the combination of both form the mixed research approach and that is going to be applied in this research study; It will help increase the accuracy of the results through employing in-depth interviews followed by questionnaire surveys in order to detect the attitudes of transit and car users toward public transport services (Hoggart et, al.,2002; Cresswell, 2003).

“Qualitative research is vital to understanding the complexity of transportation behavior, which rests upon the subjective beliefs and behaviours of the individual person” (Poulenez-Donovan et al.,1994). Beirao and Cabral (2007) considered a qualitative research of public transport users and car users in order to detect their attitudes towards transport and perceptions toward public transport service quality. In this case, the qualitative research consists of 8 in-depths interviews with the public; 4 interviews with car users and 4 interviews with transit users. The interviews allow people to discuss freely and to emphasize the factors that they think are essential in influencing their perceptions and acts in what concerns the choice of their transport mode. The factors mostly discussed by the interviewees are the ones featured in the questionnaire. This helps remove bias based on previous knowledge (Beirao and Cabral, 2007).

The choice of the city of Beirut relies first on the fact that it is the center of banking, commerce, medical care, and education and second on the type of transport mode dominating the city and that was discussed earlier. Besides, Beirut is known for the



diversity of its socio-demographic characteristics; the latter are going to be revealed throughout the study. Therefore, it is considered a convenient study area that will help “contextualize theoretical processes” (Hysing, 2009).

### 3.5.2 Data used

The descriptive research is characterized by a cross sectional design and relies on primary quantitative data obtained through surveying 200 people in the Beirut region. The data collection process in the case of the descriptive research is going to be structured as it will incorporate questionnaires with fixed-response choices. Those questionnaires will help in describing the characteristics of transit and car users, will assist in measuring their perceptions and in performing the statistical analyses later on (Beirao and Cabral, 2007). It must be noted that the survey targets people in the Beirut region at bus stations, in taxicabs, in buses, in cars, in “services”, in parking lots as well as passers-by.

The research also depends on secondary data collected from articles, journals, reports and other previous similar studies.

### 3.5.3 Pilot test

A pretest survey exercise was conducted among 5 respondents to assess whether the research protocol was realistic and workable. It pinpointed the weakest points of the questionnaire survey; some of which were modified whereas others were deleted (Teijlingen E.R. and Hundley V., 2001).

### 3.5.4 Instrumentation

Quota sampling is applied in this research study for the purpose of identifying the categories or subgroups necessary for inclusion in the sample (Denscombe, 2007). Public transport users and car users are the two categories selected in this case in order to determine attitudes toward public transport services (Beirao and Cabral, 2007). Therefore, 100 car users and 100 public transport users will be surveyed. It is important to mention that the surveyed car users are those who have utilized public transport at

least once during their lifetime since previous experiences always lead to higher valuation (Dimassi and Sjöstrand, 1999).

The scaling technique is non-comparative, itemized and numerical with 10 levels. Respondents will be able to evaluate each attribute at a time by selecting the number that best describes the attribute being rated.

### 3.5.5 Statistical package and statistical techniques

Statistical analysis was performed using IBM SPSS statistics version 20. SPSS, which is currently an acronym for Statistical and Presentational System Software, stood previously for Statistical Package for Social Scientists. SPSS helps manipulate complex applications through the many features it provides, assists in the reproducibility process, and simplifies repetitive tasks. The following types of analysis were conducted:

- Descriptive analyses were put into practice in order to keep track of the variables used.
- Regression test was tried in order to determine through the least squares method if the straight line best fits the data.
- The Jarque-Bera test was applied in order to measure the normality of distribution of residuals.
- The Mann-Whitney U test, a non-parametric significance test, was utilized in order to detect whether the difference between the levels of satisfaction of 2 groups is significant or simply due to a sampling error.

### 3.5.6 Conceptual framework for analyzing the data

“Service quality is a focused evaluation that reflects customer’s perception of specific dimensions of the service” (Eboli and Mazzulla, 2009). The “Customer Satisfaction Index” or “CSI” is an accurate measure of the previously mentioned “service quality evaluation” (Hill et al., 2003). It quantifies the views of customers, reveals accurately the main causes leading to their satisfaction or dissatisfaction, allows the monitoring of service quality, and exposes the strategies that can be adopted in the future (Eboli and Mazzulla, 2009). To summarize, CSI or “the voice of the customer” is

the overall measure of service quality and is generally calculated through the employment of a numerical scale having 10 levels (Poliakova, 2010).

CSI calculation leads to improvement in five essential domains:

- “Better understanding of the customers
- Greater enforcement of customer expectations in the specifications
- Better products and services realization
- Better visibility and less hype
- Growing sense of customers for the products and services”

(Poliakova, 2010)

However, CSI doesn't take into account the heterogeneity of perceptions. It basically permits an evaluation of transit service quality through the calculation of the rates of satisfaction and importance. The most important attributes for the passengers can be identified through the analysis of importance rates (Eboli and Mazzulla, 2009).

CSI is calculated through the application of the following formula:

$$CSI = \sum_{k=1}^N [\bar{S}_k \cdot W_k]$$

$\bar{S}_k$  : is the average of the satisfaction rates expressed by users regarding the service quality attribute identified in this case by “k”

$W_k$  ( importance weight): is a weight of the attribute expressed by “k” and depends on the importance rates expressed by users. “Specifically, is the ratio between the mean of the importance rates expressed by users on the  $k$  attribute and the sum of the average importance rates of all the service quality attributes.”

$$W_k = \frac{\bar{I}_k}{\sum_{k=1}^N \bar{I}_k}$$

Once the importance rates were dispersed from the average value, it is preferable that the correction of the importance weights is performed. The same is performed for satisfaction scores once satisfaction rates were dispersed from the average value. All these adjustments allowing the analyses of satisfaction and importance rates by means of variance lead to calculating a new indicator, known as the "Heterogeneous Customer Satisfaction Index" or "HCSI" so that heterogeneity of perceptions could be taken into consideration.

$$HCSI = \sum_{k=1}^N [S_k^c \cdot W_k^c]$$

$S_k^c$  : is the average of satisfaction rates expressed by users on the "k" attribute and corrected once the rates were deviated from the average value.

$$S_k^c = \bar{S}_k \cdot \frac{\frac{\bar{S}_k}{\text{var}(S_k)}}{\sum_{k=1}^N \frac{\bar{S}_k}{\text{var}(S_k)}}$$

$W_k^c$ : is the weight of the "k" attribute, its calculation depends on the importance rates expressed by users, corrected once the rates were dispersed from the average value.

$$W_k^c = \frac{\frac{\bar{I}_k}{\text{var}(I_k)}}{\sum_{k=1}^N \frac{\bar{I}_k}{\text{var}(I_k)}}$$

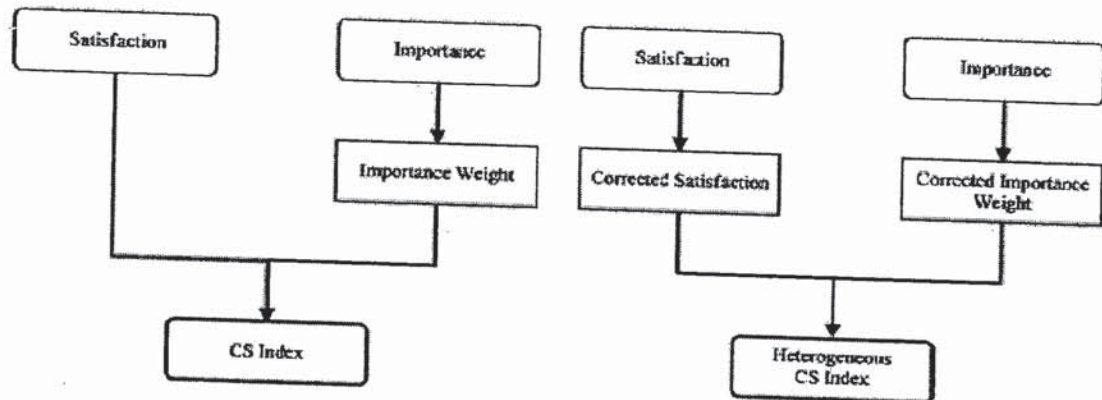


Figure 3.1: CS index versus Heterogeneous CS index  
(Eboli and Mazzulla,2009)

### 3.6 Conclusion

The explanation of the various concepts, theories, frameworks and methods of data collection and analysis is clearly displayed. Even though several researchers have already applied the proposed methodology, it remains up to the findings to determine whether it is applicable or not in this research study.

## Chapter 4

### FINDINGS

#### 4.1 Introduction

To examine and understand the relationships between variables, thorough data analysis is put into practice; its main purpose is to highlight useful information that can be implemented in conclusion suggestions and decision making processes. First of all, descriptive analysis was conducted in order to demonstrate respondents' demographic characteristics and to link them to the other independent variables when possible. Next, the Mann-Whitney U test was applied in order to evaluate whether the medians on a test variable differ significantly between two groups. Both the descriptive analysis and the Mann-Whitney U test supported largely the discussion of the findings and the hypothesis.

#### 4.2 Descriptive Statistics

Descriptive analysis contributed to the following results: 56.5% of respondents are males whereas 43.5% of respondents are females. The majority of the group (33.5%) age between 25 and 34 followed by 20.5% of the group aging between 15 and 24. 52.5% of participants are single and 40% are married with 36.5% of the group having children. Besides, 80.5% of respondents are employed; 16.5% of which are involved in financing, insurance, and business services. The most common monthly income ranges between 500 and 999 USD (34% of participants). It is important to mention that 44% of respondents carry a bachelor university degree and 22% have a masters degree. Moreover, 50% of participants are Mount Lebanon residents, 74% own a car and 88% hold a driving license. Finally, among the 100 car users surveyed, 81% claimed that they will shift into the transit mode once transit service attributes that they perceive as important are improved.

A precise elaboration requires to separate transit and car users' descriptive analyses. The majority of transit users' age ranges between 15 and 24 (28%) and between 25 and 34 (26%). On the other hand, most car users' age ranges between 25 and 34 (41%). Furthermore, 58% of transit users are males and 55% of car users are males. Marital status' cross tabulation results are so close; for instance 52% of transit users are married and 53% of car users are married. The same scenario is repeated in the case where users have children; 39% of transit users have children and 34% of car users have children as well. Next, employment is considered high in both cases; 77% of transit users are employed and 84% of car users are employed. The majority of transit users (16%) work in transport, logistics, and storage whereas the majority of car users (25%) are involved in financing, insurance and business services. In what concerns monthly incomes, 51% of transit users' income ranges between 500 and 999 USD, whereas 34% of car users income ranges between 1000 and 1499 USD and 23% have an income ranging between 1500 and 1999 USD. Most of the respondents surveyed, whether car or transit users, reside in Beirut and Mount Lebanon regions; 43% of transit users live in Mount Lebanon region and 37% live in Beirut region. 57% of car users live in Mount Lebanon region and 34% live in Beirut region. Education level seems to be higher among car drivers; while 39% of transit users have a high school degree and 38% have a bachelor degree, 50% of car users carry a bachelor degree and 33% carry a masters degree. Finally, it is mandatory to indicate that 48% of transit users own a car and 76% have a driving license.

Table 4.1: Demographic Descriptive Analysis

	N	%
<b>gender</b>		
male	113	56.5
female	87	43.5
<b>age</b>		
between 15 and 24	41	20.5
between 25 and 34	67	33.5
between 35 and 44	39	19.5
between 45 and 54	29	14.5
between 55 and 64	18	9.0
between 65 and 74	6	3.0
<b>marital status</b>		
single	105	52.5
married	80	40.0
divorced	10	5.0
widowed	5	2.5
<b>children</b>		
yes	73	36.5
no	127	63.5
<b>employment</b>		
yes	161	80.5
no	39	19.5
<b>sector</b>		
agriculture	2	1.0
healthcare, social, and personal services	26	13.0
transport, logistics, and storage	23	11.5
financing, insurance, and business services	33	16.5
media, journalism, and publishing	7	3.5



teaching and education	12	6.0
defense, military, and governmental services	14	7.0
wholesale and retail trade, leisure and tourism	12	6.0
IT and technology	13	6.5
engineering and manufacturing	17	8.5
construction and real estate	2	1.0
<b>monthly income in USD</b>		
less than 500	27	13.5
between 500 and 999	68	34.0
between 1000 and 1499	50	25.0
between 1500 and 1999	30	15.0
between 2000 and 2499	13	6.5
between 2500 and 3000	6	3.0
more than 3000	6	3.0
<b>residence</b>		
beirut	71	35.5
mount lebanon	100	50.0
bekaa	5	2.5
south	12	6.0
north	12	6.0
Total	200	100.0
<b>education</b>		
high school degree	54	27.0
B.A. university degree	88	44.0
masters university degree	44	22.0
other	14	7.0
Total	200	100.0
<b>car</b>		

yes	148	74.0
no	52	26.0
<b>driving license</b>		
yes	176	88.0
no	24	12.0

Figure 4.1: Respondents' Age Range Chart

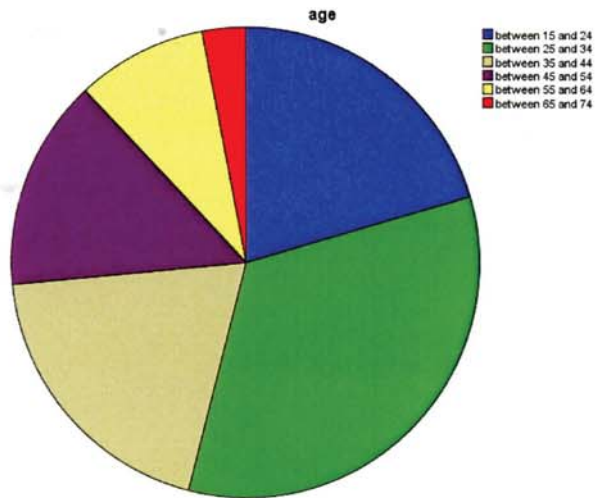


Table 4.2: Age \* CarorTransit Crosstabulation

Count

	carortransit		Total
	transit user	car user	
between 15 and 24	28	13	41
between 25 and 34	26	41	67
between 35 and 44	20	19	39
between 45 and 54	11	18	29
between 55 and 64	9	9	18
between 65 and 74	6	0	6
Total	100	100	200

Figure 4.2: Respondents' Gender Chart

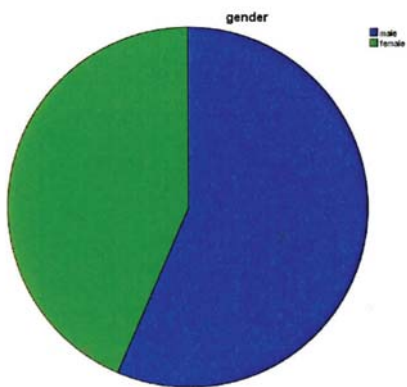


Table 4.3: Gender \* CarorTransit Crosstabulation

Count

		carortransit		Total
		transit user	car user	
gender	male	58	55	113
	female	42	45	87
Total		100	100	200

Figure 4.3: Respondents' Marital Status Chart

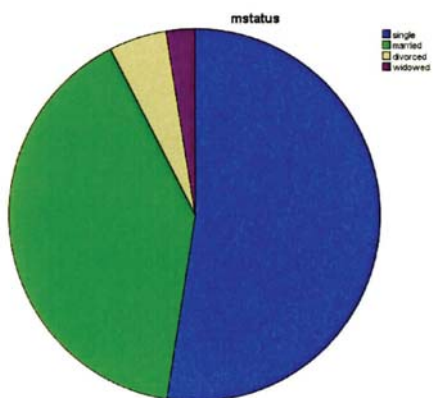


Table 4.4: Mstatus \* CarorTransit Crosstabulation  
Count

		carortransit		Total
		transit user	car user	
mstatus	single	52	53	105
	married	38	42	80
	divorced	6	4	10
	widowed	4	1	5
Total		100	100	200

Figure 4.4: Respondents' Children Chart

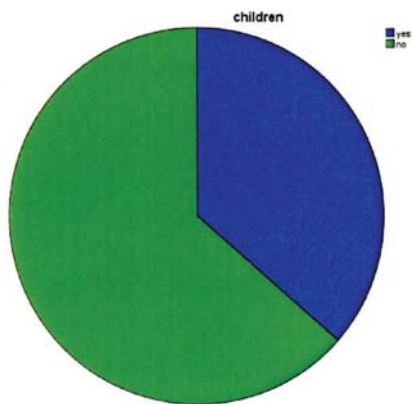


Table 4.5: Children \* CarorTransit  
Crosstabulation

Count

		carortransit		Total
		transit user	car user	
children	yes	39	34	73
	no	61	66	127
Total		100	100	200

Figure 4.5: Respondents' Employment Chart



Table 4.6: Employment \* CarorTransit Crosstabulation

Count

		carortransit		Total
		transit user	car user	
employment	yes	77	84	161
	no	23	16	39
Total		100	100	200

Figure 4.6: Respondents' Sector Chart

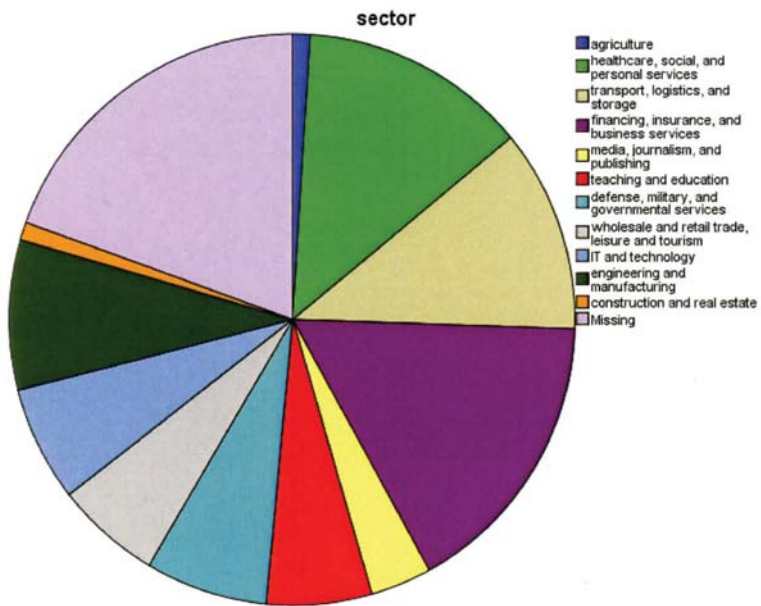


Table 4.7: Sector \* CarorTransit Crosstabulation  
Count

	carortransit		Total
	transit user	car user	
agriculture	2	0	2
healthcare, social, and personal services	13	13	26
transport, logistics, and storage	16	7	23
financing, insurance, and business services	8	25	33
media, journalism, and publishing sector	3	4	7
teaching and education	6	6	12
defense, military, and governmental services	10	4	14
wholesale and retail trade, leisure and tourism	4	8	12
IT and technology	8	5	13
engineering and manufacturing	6	11	17
construction and real estate	0	2	2
Total	76	85	161

Figure 4.7: Respondents' Monthly Income Chart

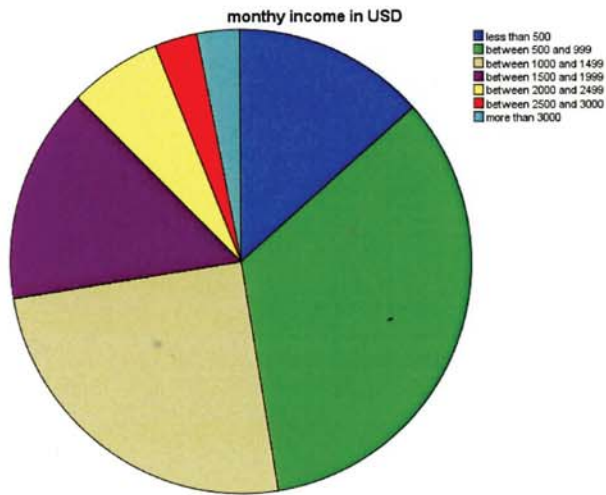


Table 4.8: Monthly Income in USD \* CarorTransit Crosstabulation

Count

		carortransit		Total
		transit user	car user	
monthly income in USD	less than 500	24	3	27
	between 500 and 999	51	17	68
	between 1000 and 1499	16	34	50
	between 1500 and 1999	7	23	30
	between 2000 and 2499	2	11	13
	between 2500 and 3000	0	6	6
	more than 3000	0	6	6
Total		100	100	200



Figure 4.8: Respondents' Residence Chart

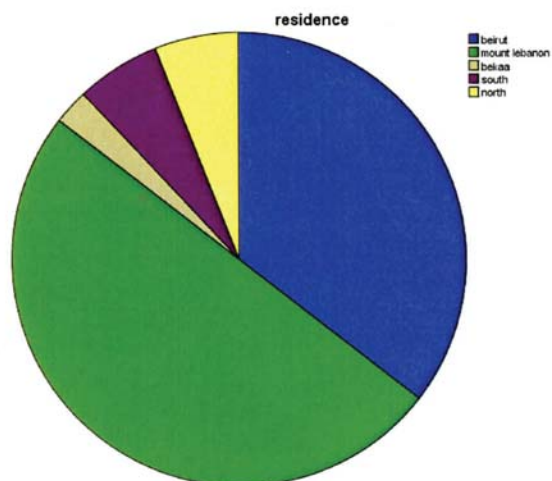


Table 4.9: Residence \* CarorTransit Crosstabulation

Count

		carortransit		Total
		transit user	car user	
residence	beirut	37	34	71
	mount lebanon	43	57	100
	bekaa	4	1	5
	south	9	3	12
	north	7	5	12
Total		100	100	200

Figure 4.9: Respondents' Education Chart

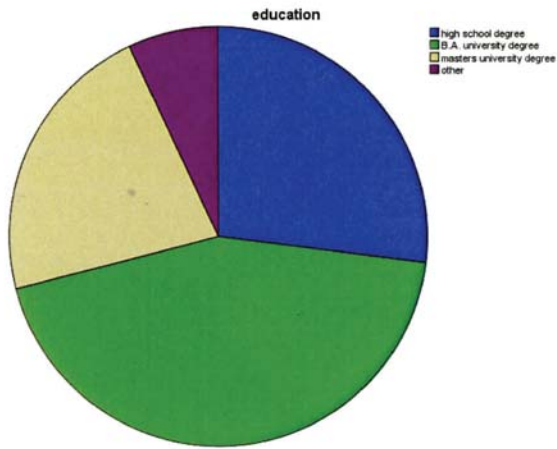


Table 4.10: Education \* CarorTransit Crosstabulation

Count

	carortransit		Total
	transit user	car user	
high school degree	39	15	54
B.A. university degree	38	50	88
education masters university degree	11	33	44
other	12	2	14
Total	100	100	200

Figure 4.10: Respondents' Car Ownership Chart

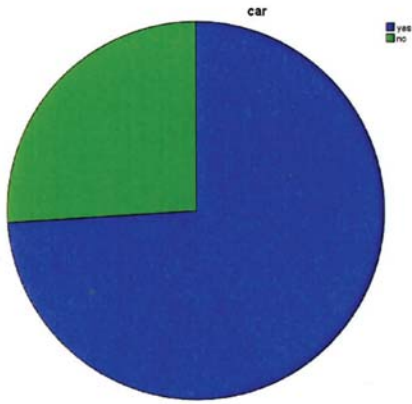


Table 4.11: Car \* CarorTransit Crosstabulation

Count

		carortransit		Total
		transit user	car user	
car	yes	48	100	148
	no	52	0	52
Total		100	100	200

Figure 4.11: Respondents' Driving License Availability Chart

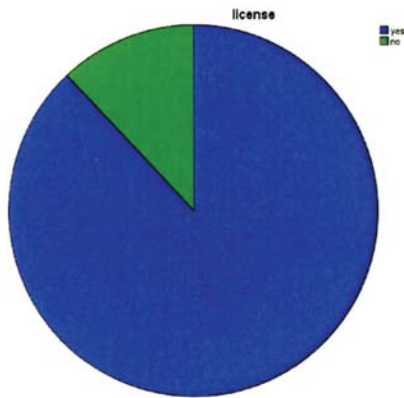


Table 4.12: License \* CarorTransit  
Crosstabulation

Count

		carortransit		Total
		transit user	car user	
license	yes	76	100	176
	no	24	0	24
Total		100	100	200



### 4.3 Discussion of the main findings

#### 4.3.1 CSI calculation

The CSI for each respondent was calculated separately as shown below.

$$W_k = \frac{\bar{I}_k}{\sum_{k=1}^N \bar{I}_k}$$

$$CSI = \sum_{k=1}^N [\bar{S}_k \cdot W_k]$$

CSI =2.648

The resulting customer satisfaction index turned out to be too low as expected. It shows that Lebanese people are dissatisfied with the transit service quality although many of them are obliged to utilize it on a daily basis.

#### 4.3.2 Calculation of attributes' average importance

The average importance for each attribute was calculated. The results varied from 7 to 9 on a 1-10 point scale. This indicates that almost all attributes discussed are viewed as important by the Lebanese people. However, those that scored a 9 value are considered as the most important such as: public transport system's geographic accessibility, schedule flexibility, availability of disabled specialized services, availability of signs at stops, accuracy of arrivals/departures, accuracy of travel time, the ability to address complaints and suggestions, protection against weather, stop cleanliness, vehicle cleanliness, style of starting off and braking, crowding, availability of seats, driving style, lighting of the vehicle and station, monitoring of area, ride elements, supervision of policeman/driver, and odor and dust production.

## 4.3.3 Calculation of the most important attributes' satisfaction levels

Table 4.13: Satisfaction Levels for Important Attributes

Most Important Attributes	Satisfaction Level
geographic accessibility	4
schedule flexibility	4
availability of disabled specialized services	2
availability of signs at stops	3
accuracy of arrivals/departures	3
accuracy of travel time	3
ability to address complaints and suggestions	2
protection against weather	2
stop cleanliness	2
vehicle cleanliness	3
style of starting off and braking	2
crowding	3
availability of seats	4
driving style	3
lighting of the vehicle and station	3
monitoring of area	2
ride elements	2
supervision of policeman/driver	2
odor and dust production	1

The average satisfaction level for the 19 most important attributes is 2.63 which is viewed as being very low. The low customer satisfaction witnessed is mainly the result of a mismatch between the Lebanese citizens' expectations and their real daily experiences with public transport.

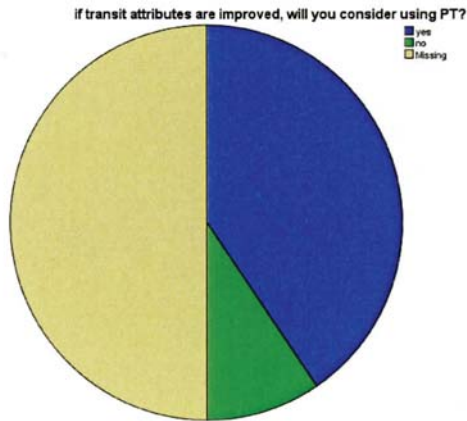
## 4.3.4 Car users' responses

Table 4.14: Car Users' Responses' Statistics

**If transit attributes are improved, will you consider using PT?**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid yes	81	40.5	81.0	81.0
Valid no	19	9.5	19.0	100.0
Total	100	50.0	100.0	
Missing System	100	50.0		
Total	200	100.0		

Figure 4.12: Car Users' Responses' Chart



The 100 car users surveyed were asked the following question: "If transit attributes are improved, will you consider using public transport?" 81% of respondents admitted that they are willing to shift to the public transport mode in case service quality attributes are improved in a way that matches their perceptions and needs. This



indicates that most Lebanese people are attached to their private cars mainly because the transit service quality is poor and not because of the desirable social attributes that cars can provide.

#### 4.3.5 Linear regression test

Linear regression is basically a statistical technique that assesses the relationship between variables. It helps display data as points on a graph and applies the least squares method to draw a straight line that best fits the data. In this case study, the data did not meet the assumptions of linear regression; The R value 0.296 indicates a low degree of correlation. Besides, the  $R^2$  value or the coefficient of determination that indicates how much of the dependent variable, "CSI", can be explained by the independent demographic variables show that only 8.7% can be explained, which is very low. All of this implies that the regression line does not fit the data very well.

#### 4.3.6 Application of the Jarque-Bera normality test

The Jarque-Bera test, which is a measure of the normality of a distribution of residuals through the employment of the calculated skewness and kurtosis, is put into practice.

Table 4.15: Descriptive Statistics- Calculation of Skewness and Kurtosis

	N	Minimum	Maximum	Mean	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
Unstandardized Residual	161	-1.30089	5.26612	0	0.902735	2.007	0.191	8.392	0.38
Valid (listwise)	N 161								

H0: Residuals are normally distributed (skewness=0 and excess kurtosis=0 also know as kurtosis=3)

H1: Residuals are not normally distributed

The Jarque-Bera test statistic is:

$$JB = N [S^2 / 6 + K^2 / 24] = 721.1488$$

Residuals are not normally distributed since JB must be less than 5. As a result, non parametric tests must be taken into consideration.

#### 4.3.7 The Mann-Whitney U test

The Mann-Whitney U test is a non parametric test that is used when samples do not meet the assumptions of normality. It is applied in the research study to understand whether satisfaction levels towards transit service quality differ based on the demographic variables while focusing on 2 groups of the independent variables, each at a time.

Table 4.16: Ranks- Car and Transit Users

	carortransit	N	Mean Rank	Sum of Ranks
	transit user	100	124.15	12414.50
csi	car user	100	76.86	7685.50
	Total	200		

Table 4.17: Test Statistics<sup>a</sup> -  
Car and Transit Users

	csi
Mann-Whitney U	2635.500
Wilcoxon W	7685.500
Z	-5.777
Asymp. Sig. (2-tailed)	.000

a. Grouping Variable:  
carortransit

From this data, it can be concluded that there is a statistically significant difference between transit users and car users group's median satisfaction index;  $z=5.77 > 1.96$  and  $\text{sig}=0 < 0.05$ . Transit users have a higher mean rank which indicates that they are more satisfied about transit service quality than car users. 52% of the transit users surveyed don't own a car and 24% don't hold a driving license. Therefore, half of them haven't experienced the use of a personal car on a regular basis and have no choice other than the public transit. This makes them more satisfied than car users. On the contrary, the latter are well aware of the advantages of the private car since they are constantly experiencing it.

Table 4.18: Ranks - Gender

	gender	N	Mean Rank	Sum of Ranks
csi	male	113	107.82	12183.50
	female	87	90.99	7916.50
	Total	200		

Table 4.19: Test Statistics<sup>a</sup> - Gender

	csi
Mann-Whitney U	4088.500
Wilcoxon W	7916.500
Z	-2.038
Asymp. Sig. (2-tailed)	.042

a. Grouping Variable: gender

From this data, it can be concluded that there is a statistically significant difference between males and females group's median satisfaction index;  $z= 2.038 > 1.96$

and  $\text{sig}=0.042 < 0.05$ . Males have a higher mean rank which indicates that they are more satisfied about transit service quality than females. This may be due to the feelings of insecurity that Lebanese females face especially while using public transport at night. Some of the women surveyed and interviewed have witnessed theft and abuse during their trips on public transport and narrated their stories with big fear.

Table 4.20: Ranks-Age

	age	N	Mean Rank	Sum of Ranks
	between 25 and 34	67	49.55	3320.00
csi	between 45 and 54	29	46.07	1336.00
	Total	96		

Table 4.21: Test Statistics<sup>a</sup>-  
Age

	csi
Mann-Whitney U	901.000
Wilcoxon W	1336.000
Z	-.563
Asymp. Sig. (2-tailed)	.574

a. Grouping Variable: age

From this data, it can be concluded that there is an insignificant difference between [25-34] and [45-54] age ranges group's median satisfaction index;  $z=0.563 < 1.96$ .

Table 4.22: Ranks- Marital Status

	mstatus	N	Mean Rank	Sum of Ranks
csi	single	105	89.97	9447.00
	married	80	96.98	7758.00
	Total	185		

Table 4.23: Test Statistics<sup>a</sup>-  
Marital Status

	csi
Mann-Whitney U	3882.000
Wilcoxon W	9447.000
Z	-.881
Asymp. Sig. (2-tailed)	.378

a. Grouping Variable: mstatus

From this data, it can be concluded that there is an insignificant difference between single and married group's median satisfaction index;  $z=0.881 < 1.96$ .

Table 4.24: Ranks- Children

	children	N	Mean Rank	Sum of Ranks
csi	yes	73	105.63	7711.00
	no	127	97.55	12389.00
	Total	200		

Table 4.25: Test Statistics<sup>a</sup> -  
Children

	csi
Mann-Whitney U	4261.000
Wilcoxon W	12389.00
Z	0
Asymp. Sig. (2-tailed)	-.950
	.342

a. Grouping Variable: children

From this data, it can be concluded that there is an insignificant difference between respondents having children and those who don't group's median satisfaction index;  $z=0.95 < 1.96$ .

Table 4.26: Ranks- Employment

	employment	N	Mean Rank	Sum of Ranks
csi	yes	161	102.86	16560.00
	no	39	90.77	3540.00
	Total	200		

Table 4.27: Test Statistics<sup>a</sup>-  
Employment

	csi
Mann-Whitney U	2760.000
Wilcoxon W	3540.000
Z	-1.170
Asymp. Sig. (2-tailed)	.242

a. Grouping Variable:  
employment

From this data, it can be concluded that there is an insignificant difference between employed and unemployed group's median satisfaction index;  $z=1.17 < 1.96$ .

Table 4.28: Ranks- Sector (1)

	sector	N	Mean Rank	Sum of Ranks
	transport, logistics, and storage	23	36.57	841.00
csi	financing, insurance, and business services	33	22.88	755.00
	Total	56		

Table 4.29: Test Statistics<sup>a</sup>-  
Sector(1)

	csi
Mann-Whitney U	194.000
Wilcoxon W	755.000
Z	-3.089
Asymp. Sig. (2-tailed)	.002

a. Grouping Variable: sector

From this data, it can be concluded that there is a statistically significant difference between transport, logistics and storage sector and financing, insurance, and business services sector group's median satisfaction index;  $z = 3.089 > 1.96$  and  $\text{sig} = 0.002 < 0.05$ . People involved in the transport, logistics and storage sector have a higher mean rank which indicates that they are more satisfied about transit service quality than those working in the financing, insurance, and business services.

Table 4.30: Ranks- Sector(2)

	sector	N	Mean Rank	Sum of Ranks
csi	healthcare, social, and personal services	26	35.98	935.50
	financing, insurance, and business services	33	25.29	834.50
	Total	59		



Table 4.31: Test Statistics<sup>a</sup>-  
Sector (2)

	csi
Mann-Whitney U	273.500
Wilcoxon W	834.500
Z	-2.374
Asymp. Sig. (2-tailed)	.018

a. Grouping Variable: sector

From this data, it can be concluded that there is a statistically significant difference between healthcare, social, and personal services sector and financing, insurance, and business services group's median satisfaction index;  $z = 2.374 > 1.96$  and  $\text{sig} = 0.018 < 0.05$ . People involved in the healthcare, social, and personal services sector have a higher mean rank which indicates that they are more satisfied about transit service quality than those working in the financing, insurance, and business services.

Table 4.32: Ranks- Sector (3)

	sector	N	Mean Rank	Sum of Ranks
csi	financing, insurance, and business services	33	20.33	671.00
	defense, military, and governmental services	14	32.64	457.00
	Total	47		

Table 4.33: Test Statistics<sup>a</sup> –  
Sector(3)

	csi
Mann-Whitney U	110.000
Wilcoxon W	671.000
Z	-2.815
Asymp. Sig. (2-tailed)	.005

a. Grouping Variable: sector

From this data, it can be concluded that there is a statistically significant difference between defense, military, and governmental services sector and financing, insurance, and business services group's median satisfaction index;  $z = 2.815 > 1.96$  and  $\text{sig} = 0.005 < 0.05$ . People involved in the defense, military, and governmental services sector have a higher mean rank which indicates that they are more satisfied about transit service quality than those working in the financing, insurance, and business services.

The main reason for the previous 3 resulting significant differences may be due to the fact that business people are most of the time well dressed up and can't tolerate the vehicle uncleanliness and crowding. They prefer other alternatives such as private cars or taxis to reach work.

Table 4.34: Ranks- Monthly Income

	monthly income in USD	N	Mean Rank	Sum of Ranks
csi	less than 500	27	35.67	963.00
	between 1500 and 1999	30	23.00	690.00
	Total	57		

Table 4.35: Test Statistics<sup>a</sup>-

Monthly Income

	csi
Mann-Whitney U	225.000
Wilcoxon W	690.000
Z	-2.877
Asymp. Sig. (2-tailed)	.004

a. Grouping Variable: monthly income in USD

From this data, it can be concluded that there is a statistically significant difference between income earners of less than 500 USD and income earners of 1500 to 1999 USD group's median satisfaction index;  $z = 2.877 > 1.96$  and  $\text{sig} = 0.004 < 0.05$ . People earning an income that is less than 500 USD have a higher mean rank which indicates that they are more satisfied about transit service quality than those earning an income that ranges between 1500 and 1999 USD. Lebanese people earning lower incomes are more satisfied about public transit than those having higher incomes mainly because most of them don't have any other alternative. On the contrary, most Lebanese people with high incomes have access to private vehicles and are used to the comfort, convenience and lux that those vehicles can offer.

Table 4.36: Ranks- Residence (1)

	residence	N	Mean Rank	Sum of Ranks
csi	beirut	71	81.62	5795.00
	mount lebanon	100	89.11	8911.00
	Total	171		

Table 4.37: Test Statistics<sup>a</sup>- Residence (1)

	csi
Mann-Whitney U	3239.000
Wilcoxon W	5795.000
Z	-.975
Asymp. Sig. (2-tailed)	.330

a. Grouping Variable:  
residence

From this data, it can be concluded that there is an insignificant difference between Beirut and Mount Lebanon residents group's median satisfaction index;  $z=0.975 < 1.96$ .

Table 4.38: Ranks - Residence (2)

	residence	N	Mean Rank	Sum of Ranks
csi	beirut	71	39.56	2809.00
	south	12	56.42	677.00
	Total	83		

Table 4.39: Test Statistics<sup>a</sup> -  
Residence (2)

	csi
Mann-Whitney U	253.000
Wilcoxon W	2809.000
Z	-2.240
Asymp. Sig. (2-tailed)	.025

a. Grouping Variable:  
residence

From this data, it can be concluded that there is a statistically significant difference between Beirut residents and residents of the South group's median satisfaction index;  $z = 2.24 > 1.96$  and  $\text{sig} = 0.025 < 0.05$ . Residents of the South region have a higher mean rank which indicates that they are more satisfied about transit service quality than Beirut residents. This indicates that it is easier to use public transport to head from the South region to Beirut region for instance. However, it's more difficult to access public transport in the Beirut region itself from one city to another.

Table 4.40: Ranks- Education

	education	N	Mean Rank	Sum of Ranks
csi	high school degree	54	55.06	2973.00
	masters university degree	44	42.68	1878.00
	Total	98		

Table 4.41: Test Statistics<sup>a</sup>-  
Education

	csi
Mann-Whitney U	888.000
Wilcoxon W	1878.000
Z	-2.143
Asymp. Sig. (2-tailed)	.032

a. Grouping Variable:  
education

From this data, it can be concluded that there is a statistically significant difference between high school graduates and masters degree holders group's median satisfaction index;  $z = 2.143 > 1.96$  and  $\text{sig} = 0.032 < 0.05$ . High school graduates have a higher mean rank which indicates that they are more satisfied about transit service quality than masters degree holders. In general, masters degree holders have better job positions and higher incomes than high school graduates which make them less satisfied.

Table 4.42: Ranks- Car

	car	N	Mean Rank	Sum of Ranks
csi	yes	148	92.05	13623.00
	no	52	124.56	6477.00
	Total	200		

Table 4.43: Test Statistics<sup>a</sup>- Car

	csi
Mann-Whitney U	2597.000
Wilcoxon W	13623.00
Z	0
Asymp. Sig. (2-tailed)	-3.484
	.000

a. Grouping Variable: car

From this data, it can be concluded that there is a statistically significant difference between car owners and non car owners group's median satisfaction index;  $z = -3.484 > 1.96$  and  $\text{sig} = 0 < 0.05$ . Non car owners have a higher mean rank which indicates that they are more satisfied about transit service quality than car owners.

Table 4.44: Ranks- Driving License

	license	N	Mean Rank	Sum of Ranks
csi	yes	176	97.74	17203.00
	no	24	120.71	2897.00
	Total	200		

Table 4.45: Test Statistics<sup>a</sup>  
Driving License

	csi
Mann-Whitney U	1627.000
Wilcoxon W	17203.00
Z	0
Asymp. Sig. (2-tailed)	-1.823
	.068

a. Grouping Variable: license

From this data, it can be concluded that there is an insignificant difference between driving license holders and non holders group's median satisfaction index;  $z=1.823 < 1.96$ .

#### 4.4 Reliability Test

Reliability is measured through the calculation of "Cronbach's Alpha". In this case, Cronbach's Alpha is 0.9 which indicates that the variables studied have a high level of internal consistency.

#### 4.5 Discussion of the hypotheses

H0: Demographic differences among the Lebanese don't influence their satisfaction towards transit service quality.

H1: Demographic differences among the Lebanese influence their satisfaction towards transit service quality.



The Mann-Whitney U test showed that differences in gender, job sector, monthly income, residence, education, and whether a Lebanese owns a car or not, influence their satisfaction towards transit service quality.

#### 4.6 Conclusion

It is mandatory that the transit service type provides the quality appropriate to the Lebanese population and supports the function and character of our environments.

## Chapter 5

### CONCLUSIONS AND RECOMMENDATIONS

#### 5.1 Introduction

Comprehensive analysis of transit service quality tends to expand the range of potential transit improvement options, and justifies more investments in transit service quality improvements. The current chapter discusses the limitations and the managerial implications of the research and then goes into the details of the recommendations as well as the facilitators and obstacles to the implementation of adequate transport service quality.

#### 5.2 Limitation of the research

Although this research was carefully prepared, limitations and shortcomings still exist. First because of the time limit, this research was conducted on a small size of the population; Only 200 questionnaires were performed. They are not enough to measure the real perceptions of the Lebanese. Moreover, the survey questionnaires were completed in the Beirut region only and half of the respondents were Mount Lebanon residents. Perceptions of the Lebanese residing outside Beirut and Mount Lebanon were not taken into consideration. The sample of customers should have been more carefully designed and drawn so that the results of the study will be considered representative of the Lebanese population as a whole. Furthermore, customer satisfaction surveys need more professional methods to avoid measuring prejudice; Satisfaction is very hard to measure since it is influenced by complicated psychological and social processes and factors. For example, a recent study revealed that customers took previous experience, media coverage, and hopes of future improvements into consideration when asked specific questions about a trip they have undergone (BEST, 2009). That's why, better evaluation techniques help planners identify policies and programs that more effectively respond to consumer needs and preferences.

### 5.3 Managerial implications

Friman and Felleson (2009) stated that satisfaction is important for understanding public transport from the customer's perspective. Thus, understanding – rather than taking for granted – the service is a key challenge for government, operators and transit agencies to improve public transport services in Lebanon. Since this study was conducted from the customer's perspective, it was able to create new insights for the management of the Lebanese transport system. Research outcomes highlighted the main factors that affect Lebanese citizens' transport mode choices. Therefore it became easier for decision makers to determine what customer-oriented strategies they must start with; improving attributes that are considered to be the most important for the Lebanese is considered a priority in order to keep existing customers and to attract new ones knowing that car users are willing to shift into public transit once service quality is improved. The most important attributes are the following: public transport system's geographic accessibility, schedule flexibility, availability of disabled specialized services, availability of signs at stops, accuracy of arrivals/departures, accuracy of travel time, the ability to address complaints and suggestions, protection against weather, stop cleanliness, vehicle cleanliness, style of starting off and braking, crowding, availability of seats, driving style, lighting of the vehicle and station, monitoring of area, ride elements, supervision of policeman/driver, and odor and dust production. By paying closer attention to the customers' needs, the demand and loyalty for public transport will progressively be enhanced.

### 5.4 Recommendations

Discretionary passengers, people who have the option of driving, are known to be too sensitive to service quality (Kittleson & Associates, 1999). Our survey results show that 81% of car users are willing to drive less and rely more on public transit provided that it becomes more comfortable, convenient, and reliable. Therefore, in order to

increase the attractiveness of public transit travel, it is recommended that both the government and transit companies take the below into consideration.

- Improve vehicle comfort and cleanliness.
- Increase service frequency and improve schedule flexibility in order to reduce wait times and vehicle crowding.
- Improve wait areas through the development of transit stations and shelters (enclosed space, with heating in winter and cooling in summer).
- Integrate prepaid fare systems to facilitate the process of getting in and out of public transport on one hand and to help create accurate transit arrivals and departures. Electronic smart cards for example can do the job.
- Improve user information, customer service, and marketing programs so that users will be constantly informed.
- Create programs, plans and activities that encourage the use of public transport and disfavor the use of the private car.
- Ensure a modal integration in a way that transit services are coordinated with walking, taxi and “service” services with signs that can be read by everyone.
- Improve accommodation of people with special needs.
- Improve security in all aspects including ride elements, lighting and driving mode through the employment of cameras, policemen, and/or specialized supervisors.
- Save the environment through controlling the used energy and the amount of emissions.

The above improvements will serve existing and new transit passengers equally. Moreover, The Lebanese society as a whole will get rid of the many problems it faces on a daily basis; congestion, roadway and parking costs, consumer costs, accidents, energy consumption and pollution emissions... Not to forget the profits that will arise on the long term from the economies of scale such as more transit-oriented land use and increased public support. Finally, the government and transit agencies will have their part of benefits as well - such as the increase in fare revenue (Litman, 2005).

### 5.5 Facilitators and obstacles

Integrated transport strategies are always subject to constraints; the financial constraints that might influence the Lebanese transport strategies might be budget restrictions that will struggle to keep within bounds the overall expenditure on the strategy and to control revenues aiming to finance certain measures. Besides, the legal and institutional barriers might be represented by the absence of legal powers and responsibilities to the implementation of transport measures. At the end, the effectiveness of the measures might be influenced by political and cultural aspects through the diverse restrictions that can be imposed by different groups.

Some of the facilitators to the implementation of effective transport strategies are the conviction of the Lebanese that the latter is a must in their societies and their continuous endeavor to exercise pressure on decision makers to proceed with the suggested plans.

### 5.6 Conclusion

This is the first research study that examines the relationship between socio-economic factors and perceptions of transit in Lebanon. The findings show that differences in gender, job sector, monthly income, education, residence, and car ownership influence satisfaction levels towards transit service quality. Knowing that transit users expressed a higher level of satisfaction, the latter remains very low in a world where the struggle for effectiveness and efficiency on all aspects and in all the communities is becoming more aggressive. Further investigation into how to alter perceptions and create optimized transport services will be more than beneficial to our community.

For instance, studies which objectives are to explore in more details the specific characteristics of the users, the effects of transit aspects on customer satisfaction and the relationship between traveler satisfaction measures and objective performance measures

are beneficial to the Lebanese cities. As Lebanon has very wide variety of culture, the above research studies will provide very rich knowledge. In addition, studies which explore the service on individual levels are also important in developing urban transport policies, which provide an acceptable equity to each group and to each city.

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**Appendix A Thesis Questionnaire**

**THESIS QUESTIONNAIRE**

**Public Transit Users**

**versus**

**Private Car Users**

**A Study of the Lebanese Perceptions toward Transit Services**

Rania Akiki

MBA Student

Notre Dame University

Public transit is a shared passenger transportation service which is available for use by the general public. Nowadays, it is considered a basic mobility service in many countries helping people reach their destinations.

The major concern of this research study is the absence of optimized public transport services in Lebanon and the increased dependency on private cars by the Lebanese. Corpuz (2007) suggests that by examining the attitudes and perceptions of different social categories towards public transport services, decision makers will be able to find the appropriate solutions for what he calls “the public inertia”. To summarize, customers will utilize public transport services in case the latter were designed in a way that matches their perceptions and needs (Beirao and Cabral, 2007).

This study’s questionnaire will help reveal Lebanese transit users’ and car users’ perceptions and attitudes regarding public transportation, will determine satisfaction and importance levels concerning the different attributes of service quality, and will give some notions about the facilitators and obstacles to the implementation of efficient public transport services in Lebanon.

## Data Collection

### 1. Gender:

- Male                       Female

### 2. Age:

- 15 – 24     25 – 34     35 – 44     45 – 54     55 – 64     65 – 74

### 3. Marital Status:

- Single                       Married                       Divorced                       Widowed

### 4. Do you have any children?

- Yes                       No

### 5. Work Status:

Do you hold currently a job position?

- Yes  
 No

### 6. If yes, what sector do you fit in?

- Agriculture  
 Healthcare, Social, and Personal Services  
 Transport, Logistics, and Storage  
 Financing, Insurance, and Business Services  
 Media, Journalism and Publishing  
 Teaching and Education  
 Defense, Military and Governmental Services  
 Wholesale and Retail Trade, Leisure and Tourism  
 IT and Technology  
 Engineering and Manufacturing

- Construction and Real Estate  
 Other \_\_\_\_\_

**7. Monthly Income Range:**

- < 500 USD       500 USD – 999 USD       1000 USD –  
1499 USD
- 1500 USD – 1999 USD     2000 USD – 2499 USD     2500 USD – 3000 USD
- >3000 USD

**8. Residence:**

- Beirut     Mount Lebanon     Bekaa     South     North

**9. Educational Background:**

- High School Degree     B.A. University Degree     Masters University  
Degree
- Other \_\_\_\_\_

**10. Car Ownership**

Do you own a car?

- Yes       No

**11. Driving License Availability**

Do you have a driving license?

- Yes       No

Rate the importance and satisfaction toward each partial criterion of transport service quality on a scale 1 to 10. Number 10 is used to indicate 100% importance and satisfaction.

Quality Criteria	Partial Criteria										
Availability	<b>Tickets procurement :</b>										
	Importance	1	2	3	4	5	6	7	8	9	10
	Satisfaction	1	2	3	4	5	6	7	8	9	10
	<b>Links to other transport systems</b>										
	Importance	1	2	3	4	5	6	7	8	9	10
	Satisfaction	1	2	3	4	5	6	7	8	9	10
	<b>Availability of validation</b>										
	Importance	1	2	3	4	5	6	7	8	9	10
	Satisfaction	1	2	3	4	5	6	7	8	9	10
	Access	<b>Geographic accessibility</b>									
Importance		1	2	3	4	5	6	7	8	9	10
Satisfaction		1	2	3	4	5	6	7	8	9	10
<b>Schedule flexibility</b>											
Importance		1	2	3	4	5	6	7	8	9	10
Satisfaction		1	2	3	4	5	6	7	8	9	10
<b>Frequency of services</b>											
Importance		1	2	3	4	5	6	7	8	9	10
Satisfaction		1	2	3	4	5	6	7	8	9	10
<b>Reliability</b>											
Importance		1	2	3	4	5	6	7	8	9	10
Satisfaction		1	2	3	4	5	6	7	8	9	10
<b>Disabled specialized services</b>											
Importance		1	2	3	4	5	6	7	8	9	10
Satisfaction	1	2	3	4	5	6	7	8	9	10	
Information	<b>Availability of services</b>										
	Importance	1	2	3	4	5	6	7	8	9	10
	Satisfaction	1	2	3	4	5	6	7	8	9	10
	<b>Customer care</b>										
	Importance	1	2	3	4	5	6	7	8	9	10
	Satisfaction	1	2	3	4	5	6	7	8	9	10





	<b>Hygiene services</b>										
	Importance	1	2	3	4	5	6	7	8	9	10
	Satisfaction	1	2	3	4	5	6	7	8	9	10
	<b>Temperature inside vehicle</b>										
	Importance	1	2	3	4	5	6	7	8	9	10
	Satisfaction	1	2	3	4	5	6	7	8	9	10
	<b>Crowding</b>										
	Importance	1	2	3	4	5	6	7	8	9	10
	Satisfaction	1	2	3	4	5	6	7	8	9	10
	<b>Availability of seats</b>										
	Importance	1	2	3	4	5	6	7	8	9	10
	Satisfaction	1	2	3	4	5	6	7	8	9	10
	<b>Design of seats &amp; leg space</b>										
	Importance	1	2	3	4	5	6	7	8	9	10
	Satisfaction	1	2	3	4	5	6	7	8	9	10
<b>Safety</b>	<b>Driving style</b>										
	Importance	1	2	3	4	5	6	7	8	9	10
	Satisfaction	1	2	3	4	5	6	7	8	9	10
	<b>Lighting (vehicle/station)</b>										
	Importance	1	2	3	4	5	6	7	8	9	10
	Satisfaction	1	2	3	4	5	6	7	8	9	10
	<b>Monitoring of area</b>										
	Importance	1	2	3	4	5	6	7	8	9	10
	Satisfaction	1	2	3	4	5	6	7	8	9	10
	<b>Ride elements</b>										
	Importance	1	2	3	4	5	6	7	8	9	10
	Satisfaction	1	2	3	4	5	6	7	8	9	10
<b>Supervision of policeman/driver</b>											
Importance	1	2	3	4	5	6	7	8	9	10	
Satisfaction	1	2	3	4	5	6	7	8	9	10	
<b>Environment</b>	<b>Used energy source</b>										
	Importance	1	2	3	4	5	6	7	8	9	10
	Satisfaction	1	2	3	4	5	6	7	8	9	10
	<b>Emission class</b>										
	Importance	1	2	3	4	5	6	7	8	9	10
	Satisfaction	1	2	3	4	5	6	7	8	9	10
	<b>Vehicle noise</b>										
	Importance	1	2	3	4	5	6	7	8	9	10
	Satisfaction	1	2	3	4	5	6	7	8	9	10
	<b>Odor and dust production</b>										
Importance	1	2	3	4	5	6	7	8	9	10	

	Satisfaction	1	2	3	4	5	6	7	8	9	10
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For car users:

If public transit service attributes are improved, will you consider using public transport?

Yes

No

For any questions regarding this research, do not hesitate to contact me at:

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Thank you for your cooperation