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The American University in Cairo
School of Global Affairs and Public Policy

**GOVERNMENT PROVISION AND REGULATION OF BUS SERVICE IN
CAIRO**

A Thesis Submitted to the

Public Policy and Administration Department

in partial fulfillment of the requirements for the degree of

Master of Public Policy

By

Mohamed Abdelsalam Elkaramany

Under the supervision of Dr. Hamid Ali

Associate professor of Economics and Department Chair

Spring 2015

DEDICATION

To the one who has always had faith and confidence in me. To the one who encouraged me and has been very understanding and supportive during the years I spent studying my masters. I dedicate this thesis, with gratitude, to my beautiful and ever supportive wife Marwa Ezz.

And to God's precious gifts, my two daughters Amina and Thurayya, for whom I will always try to go further and be a role model.

And to my mother who always supported and encouraged me. I am truly indebted to her and will always appreciate what she has done for me.

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First and foremost, all the praises be to Allah the gracious, may He be glorified and exalted, for his countless blessings, guidance and help

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I also would like to thank the two readers of this thesis: Dr. Shahjahan Bhuiyan and Dr. Khaled Abdel Halim whom I had the honor to work as teaching assistant while studying my master.

Mohamed Elkaramany

Spring 2015

"God, His angels and all those in Heavens and on Earth, even ants in their hills and fish in the water, call down blessings on those who instruct others in beneficial knowledge."

Prophet Muhammad Peace be upon him

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Mohamed Abdelsalam Elkaramany

Supervised by Dr. Hamid Ali

ABSTRACT

The Cairo Transport Authority (CTA), an economic agency affiliated to Cairo Governorate, is responsible for operating the publicly owned buses, in addition to its role as the market regulator of transit bus. The bus service provided by the CTA covers Greater Cairo region, an extensive geographical area including three Governorates; Cairo, Giza and Qalyubia. Given the wide spread of poverty in Greater Cairo, the necessity to commute and the positive externalities associated with people's mobility, the Government of Egypt controls the bus fares to make public bus ridership affordable to a broad range of clientele. Accordingly, it supports the CTA through a generous subsidy package that kept growing over the years. Even though, the CTA suffers from the inherited problems of the bureaucracy such as the overstaffing and the chronic budget deficits.

Such being the case, it was essential to assess how the government intervention through service provision and regulation affects the quality of bus service. Since the available data is not sufficient to conduct quantitative analysis which is more frequently used in transport economics, a qualitative approach was pursued to investigate whether the CTA is capable of providing a convenient bus service.

Based on the findings of a focus group discussion and in depth interviews with commuters, the term convenience encompasses travel time, service reliability, accessibility and comfort. The findings suggested that the travel time is high, the service is neither reliable nor comfortable and also there are some problems regarding operating times and facilities for people with disabilities.

Keywords: Transit bus, Urban Transportation, Travelers' convenience, Economic regulation,

Greater Cairo

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CHAPTER 1: INTRODUCTION

The importance of urban transport in a modern city is unquestionable. It is a prerequisite and byproduct of development as it has strong ramifications on economic growth, the environment and public health (Urban Transport and Public Health, 2009). Yet, it requires well planning and an efficient public administration system that put in force a set of adequate policy measures that ensures the creation of a sustainable and effective transport system. In addition, modern and sophisticated modes of urban transportation networks reflect a city's level of modernity and economic development.

Urban transportation determines the mobility of people, directly affects their daily lives and shapes their decisions regarding where to work, where to send kids for school, where to shop...etc. Needless to mention that when people commute they are looking for a convenient, safe, affordable and reliable means of transportation. So if people's mobility is a challenge, providing convenient, affordable and reliable urban transportation is even a harder endeavor. That's why governments across the world strive to find solutions for urban transportation problems.

As modern cities occupy a relatively large geographical space and host a diversity of economic activities, people need an advanced network of urban transport in order to move longer distances and make more trips (UNCHS [HABITAT], 2001). Thus urban transportation is

sometimes described as “*the most important industry in the world without which even a grocery store cannot be run* (Hensher, 1977, p. 16). For that particular reason, urban transportation is conceived by governments as a necessity good, that should be enjoyed by everyone without infringing upon the others’ right to use it. As a result, urban transportation cannot be completely left to the market forces, and governments usually play a leading role in either providing the service by themselves, or by setting the regulatory boundaries within which the private sector can operate.

In addition to being so critical for economic development, government intervention in urban transport sector is justified by achieving equity through internalizing positive externalities or the economies of scale presumably characterizing the industry (Reeven, 2008). To ensure the mobility of the poor segments of the society, subsidies are allocated to urban transit sector to make the fares relatively low and affordable. On the other hand, urban transit has a positive externality, which means a benefit gained by a third party without paying the cost or the price of that benefit. For example, improving urban transport system reduces traffic congestion and thereby allow for better commercial truck deliveries that benefit both truck drivers and business owners (Harriet, Poku, & Emmanuel, 2013). In addition, businesses located in distant areas will have access to more diverse labor market and thereby contribute to job generation and productivity enhancement (Weisbrod & Reno, 2009).

Although it is sometimes challenging to measure the impact in monetary value of improving urban transportation on economic performance, some studies were able to do so. For example, a study conducted in New York showed that the value of properties increases by more than two dollars with every one foot closer to a light rail station (Hess, 2007). Another study by

Cambridge Systematics and the Economic Development Research Group (2003) in Wisconsin estimated a possible return of \$ 1.6 for every \$ 1 invested in transit projects as a result of connecting welfare recipients to job markets.

In Greater Cairo, modes of urban transport and bus service in particular are overly used. Residents and visitors of Cairo are very familiar with the typical public bus overly crowded with passengers while some are hanging outside, a scene that has been extensively portrayed in movies and artwork describing Cairo and its culture (El-Menshawy, 2005). Riding a public bus in Egypt is a real challenge. Schedules rarely exist and if they do they are not accurate due to the unexpected traffic volume on Cairo roads. People are usually seen waiting for the bus in long lines in bus stops without shelter. In addition, buses are in a bad condition and they are not equipped with the facilities or designated places for the elderly, pregnant women or passengers with disabilities. Buses are also unsafe place as the media frequently reports on pickpocketing and sexual harassment incidents on board of buses, and the bad driving attitudes of both public and private buses drivers are clearly observed in Cairo streets.

1.1 Research problem

With a steady and high increase in the population growth in Egypt over the past forty years (World population review), rapid urban sprawl, high internal migration rates to Cairo, urban transport is undersupplied and of a deteriorated quality. In addition to the weak and fragmented authorities in charge of urban transportation that are neither capable of facing the increasing demand nor improving the quality of the service (World Bank, 2006).

The poor network of different modes of urban transit in Cairo is a major contributor to the chronic congestion in Egypt's capital. Congestion is *“caused by an excessive usage of automobiles underpriced relative to alternative modes of transport for example, bus or railway* (Ahn, 2009, p. 26). Congestion has substantial economic shortcomings. The economic cost of congestion in Greater Cairo Metropolitan Area is estimated to be 3.6% of the country's total GDP. These costs include: delays and the time wasted due to the change in expecting the average travel time, cost of excess fuel wasted, environmental issues due to the amount of CO₂, costs of accidents, injuries and loss of life, loss of productivity, and the vehicles operating costs and maintenance (World Bank, 2010). Congestion has also negative effects on transit buses. Since buses unlike rail, share traffic with other motorized vehicles, congestion increases travel time, waiting time, and the operational costs.

Within this context it is inevitable to attempt to understand whether regulation and government intervention had positive implications on the availability and quality of the delivered service.

1.2 Research Objective

The purpose of this thesis is to study the role of the government in providing and regulating bus service in Greater Cairo and to investigate the impact of that role on the quality of public bus transportation. This will be achieved by examining the current market structure both on the demand and supply side to assess how the government intervention helps or impedes achieving the most efficient outcome which could be translated in responding to the needs of commuters in Cairo.

1.3 Research question

To what extent does the government provision and regulation of bus transit service in Greater Cairo affect travelers' convenience?

To fulfill the research objective and in answering the research question, a number of sub questions will be addressed. Although, they will not be discussed separately or in an exhaustive manner, the answers to the following sub-questions will guide the research:

1. On the supply side: Who are the service providers? What are the requirements for market entry? What are the transport modal options in Cairo other than transit buses? How is the service designed: routes, stops, wait time...etc.? How does the CTA plan to respond to the future demand?
2. On the demand side: Who are the bus riders? Are they satisfied with the service? Are there any potential consumers that may possibly join the market if the transit bus service improves? What determines the demand on bus ridership?
3. Regulations and regulation making: Who determines the CTA bus fares? Who is the regulator of transit bus service? How are privately operated buses contracted? What are the requirements for market entry?

If the government intervention is usually justified by achieving the public interest and creating equity by providing basic services to those who are economically disadvantaged, so does the government succeed in satisfying the passengers' travel needs and aspirations?

CHAPTER 2: LITERATURE REVIEW

2.1 Government regulation of the economy

Government regulation and intervention in the economy has long been an issue for debate and controversy among researchers and policy makers. A wealth of literature tackled government regulation through multiple approaches, however the central question remains why do governments intervene and what are the consequences of that intervention? Although economic regulation is a cross cutting topic among different disciplines, most of the works are contributed by economists. According to (Leight, 2010; Croley, 2007; Posner, 1974) there are two major schools that explain government regulation of the economy; the public interest theory and the public choice theory. The two theories hold conflicting explanations for government regulation of the economy and business.

The contributions on the public interest school originated mainly from the writings of welfare economists who defended regulation on the grounds that government intervention is necessary to ensure the efficient market performance. They do not necessarily believe that the government is benevolent by nature, and admit that regulation has a cost. However, such a cost is less than the cost of market failure that could be highly devastating (Helm, 2006). Thus, their concern is not whether the government has to regulate or not but how to better regulate. The questions of what an effective and efficient regulation means and how to assess its impact are areas of research and enquiry using tools such as Regulatory Impact Assessment (Kirkpatrick & Parker, 2008).

Advocates of regulation and the government intervention in the economy believe that leaving the market on its own without regulation maybe destructive (Stiglitz, 2009) and that the invisible hand that Adam Smith claimed to be guiding the market is really invisible because it does not exist (Stiglitz, 2010).

They believe that regulations do not impede competition, and claim that since perfect competition can never be attained in the presence of externalities, imperfect information and market power, the government has an obligation to intervene on behalf of the public to correct these deficiencies and protect the public interest (Christensen, 2010).

Externalities create economic gains or losses to third parties who are not participating in an economic transaction. Pigou (1932) stressed on externalities as a plausible justification for the government intervention. He suggested that the most powerful and influential policy tools to deal with both negative and positive externalities are taxes and subsidies that help optimizing the market output and help achieving the public interest. For example, education has a positive externality on health (Ricci & Zachariadis, 2013) as it raises the awareness about disease transmission, contagious infections, the importance of vaccination and getting medical help when needed. Conversely, industries producing greenhouse gas emission have a negative externality on health (Rezai, Foley, & Taylor, 2012), thus the government should subsidize education and levy correction taxes on air polluting industries (Christiansen & Smith, 2012).

The imperfect information is another important factor that calls for government intervention and regulation (Aranson, 1990). Accurate information is significant for making any

rational economic decision. A consumer will not purchase a product if s/he knows that it has defects that would harm her/him. A major problem then arises when there exist asymmetrical information among producers and consumers (Akerlof, 1970). Left unregulated, big firms tend to use their informational advantage and resources to cheat and abuse consumers by, for instance, producing false advertisements or hiding necessary information about their products that if revealed may induce customers not to purchase them (Stiglitz J. E., 2010). Thus, the government through regulation attempts to provide as much necessary information as possible to assist market participants in making the most rational decisions such as disclosure and truth in labeling (Lanam, 2007).

In addition, through antitrust policies, governments seek to promote competition and to ensure that no single firm or a coalition of producers can set a commodity price above the marginal cost of production by determining the market output (Stucke, 2009). Where monopolistic practices exist, economic incentives are distorted and the market equilibrium is not reflecting the real potential of the economy by driving out current or potential participants, either producers or consumers, from the market (Beecher, 2000; Horton, 2006). Conversely, economies of scale characterizing certain industries is another inevitable reason for the government intervention, as Mankiw (2009) explained that some industries are best operated through a natural monopoly as the cost of producing extra unit of output reduces with the increasing number of units produced. For instance, electricity transmission is better undertaken by a monopsonist (Belyaev, 2007); a single buyer of the wholesale electricity who then sells it to distribution utilities. This kind of industries requires government regulation that restrict market entry.

Furthermore, regulation is justified by the government's commitment to provide public goods that cannot be supplied by the market such as clean air, national security, knowledge and information (Stiglitz, 1999). Public goods have two characteristics: non-excludability and non-rivalry. The former means that once a good is available it is impossible or very difficult to restrict its consumption by certain individuals while the latter means that the consumption of one individual of that good does not affect others' rights of consuming it (Eisner, Worsham, & Ringquist, 2006). Driven by profit generation motives, the private sector will never supply those goods since they are free and their consumption cannot be limited to only those who pay (Lemieux, 2012). Accordingly, the government has a legal obligation to supply those goods and services (Samuelson, 1954)

Proponents of regulation also highlight the fundamental role of regulation in securing property rights. Though usually sought by businesses that invest in research and development, intellectual property rights laws, trademarks, patents and copy rights are meant to create incentives for investment and encourage innovations and inventions that contribute to employment generation and economic growth (Hudson & Minea, 2013; Seville, 2011).

Regulation is also essential for consumer protection, workers' safety and the development of individuals skills and capacities (Hirschauer & Bavorova, 2014). In the absence of appropriate regulation, workers could be adversely affected in the workplace or forced to work extra hours without compensation. Thus even in a country like the USA, which has a reputation of deregulation (Jacobs, 2007), the federal, state and local governments have a constitutional right to set a minimum wage (*West Coast Hotel Co. v. Parrish*, 1937) and the Congress enacted the "*Occupational Safety and health Act*" in 1970 to protect workers in the workplace from dangers,

exposure to toxic substances and hazardous materials (Occupational Safety & Health Administration). Similarly, producers are required to meet minimum production quality standards to make sure that the products are not harmful.

The public choice theory on the other hand argues that the market by itself is the best guarantee for maximizing the public interest. Its advocates believe that economic regulation does not serve the public interest as claimed by the advocates of government intervention, but rather distorts the economic incentives, and thus they call for a limited government with a minimal intervention in the economy (Buchanan & Tullock, 1962; Friedman & Friedman, 1990; Holcombe R. G., 2012; Cobin, 2014). Public choice proponents fiercely oppose government intervention to the extent that conservatives in the USA described the government as a beast that has to be controlled, and launched *starve the beast* strategy to cut federal taxes to reduce the government intervention in the economy (Bartlett, 2007).

Public choice theory can be traced back to Adam Smith, the father of modern economics, who laid down the foundations of the free market economy in his seminal work “An inquiry into the nature and causes of the wealth of nations” (1776). He believed that the market can achieve its optimal outcomes with a minimal intervention from the government. Market participants seek their self-interest and do not intend to benefit each other, however guided by the invisible hand, the millions of economic transactions will automatically adjust the price at an equilibrium point where both producers and consumers are satisfied.

Building on the principles of free market economy, a wealth of literature has been contributed by political scientists, historians and economists attacking regulation on the basis

that it is a part of a political process that begets corruption and does not have anything to do with the society's welfare.

Coase (1960) rejected Pigou's treatment of externalities and refused that its implications could be rectified by taxes and subsidies. He believed that when the government imposes taxes on a business or someone it is restricting his freedom and harming him in favor of someone else. Instead, he suggested that problems of externalities can better be solved when the harming and the harmed bargain with each other and reach a solution provided that there are low transaction costs.

Stigler (1971) in his pioneering work "the theory of economic regulation" argued that the government intentionally uses regulations to provide economic benefits to some groups and not to achieve the public interest. The group with the most political power will be able to influence the government to regulate in its favor. According to him, the main two regulations sought by business groups are subsidies and barriers to entry; two policy sets that distort economic incentives and impede competition. Influenced by Stigler's work, Peltzman (1976) crystalized this idea by viewing regulation as a good in itself that had a price, supply and demand. But instead of having one consumer, several business groups put their "*bids*" for government regulation, and each of them will gain some benefits according to the price it is willing to pay.

Becker (1983) added a political perspective to the public choice theory by analyzing groups' political behavior in regulation making. He explained how political competition among various pressure groups is centered around the deadweight cost of taxes and subsidies. A group having higher stakes in a regulation will be more willing to invest in influencing policy makers.

The assumptions of Stigler, Peltzman and Becker gain more plausibility within the *logic of collective action* developed by Mancur Olson (1971). The central premise of the *logic* is that groups with limited membership are able to achieve the common good of the group more than groups with large base of membership. Each member in a small group has higher incentive to participate in the cost of achieving the common good because his share from the profits gained will be higher than if he is a part of a large size group. Members of larger groups on the contrary know that a common good once provided, it cannot be restricted to those who pay for it. In addition, they expect an incremental benefit from barring the cost of the common good. Thus they tend to be free riders; to wait for others to pay the cost and they benefit freely. The same *logic* applies to regulation, that creates concentrated gains for small number of groups with a diffuse cost incurred by the population in large.

The rationale beyond public choice account of regulation is that policy makers who have the authority to make regulations are “captured” by small in size, yet, powerful business groups that influence their decisions. .Regulatory capture which is populated in the press and recently in academic literature under the term crony capitalism (Holcombe R. , 2013) is a leading cause for corruption and misuse of power (Svensson, 2003). Policy makers and politicians seek to maximize their self- interest and their utmost goal is to remain in power or to be reelected, and by regulating in favor of business groups, the reward will take the form of financing electoral campaigns, offering bribes or other financial benefits and sometimes promises of future employment opportunities after leaving office or what is called the “*revolving door*” phenomenon (McMillan & Zoido, 2004; BÓ, 2006)

Regulatory capture is better understood within the political dimension of public choice theory that is devoted to studying and examining the relationship between political behavior of individuals and the economy (Shughart, 2008). According to the works of Arrow (1950), Downs (1957), Caplan (2007) and Somin (2008), ordinary citizens chose to be rationally ignorant about politics as they believe that they can hardly influence the outcomes of a political process through their votes. Consequently they open the door for other self- interest maximizing agents to engage with bureaucrats and politicians in rent seeking and other forms of manipulation to produce favorable regulations that strengthen their positions in the market and allow them to accumulate profits that otherwise could not be achieved.

Government intervention then has a high cost that adversely harming the economy. Many empirical studies supported public choice ideas by finding that different forms of regulations aim at protecting existing businesses from competition from potential rivals. For example Djankov, La Porta, De-Silanes, and Shleifer (2002) examined the procedures, cost and time imposed by the government to establish a new business in eighty five countries and found that countries with more entry barriers have higher rates of corruption without evidence that heavy regulation adds to the consumers. Another study by Angelopoulos, Philippopoulos and Vassilatos (2009) found that 18 % of tax revenues in the whole euro area is extracted as rents which constitute almost 7% of the GDP.

Not only regulation is a byproduct of trade between policy makers and businesses, but also a result of logrolling agreements between policy makes themselves. Legislators in many countries are consistently engaged in reciprocal voting on proposed bills among each other (Aksoy, 2012; Stratmann, 1995; Tullock, 2005). A study by Gamkhar and Ali (2008) examined

panel data of forty eight states that include highway demonstration grants as well as all highway bills passed by the Congress during the period from 1983-2003. Their findings suggested that the Congress in allocating federal grants to states is captured by powerful and influential coalitions that are able to direct the Congress actions to regulate in favor of powerful states.

2.2 Urban transportation economics

The body of literature on urban transport economics is also broad and deep. Transport economists had covered the topic from several perspectives and had employed different methodologies and approaches to examine modes of urban transportation and to analyze them.

However, most of the papers reviewed had used quantitative analysis to measure the cost of operating public buses, to understand the travel behavior of passengers and also to assess whether it is better for the economy/ society to regulate or deregulate. Since quantitative analysis requires accurate and sufficient data, most of quantitative studies were conducted in USA and Europe but little in the developing countries where data is either not existing or insufficient.

One set of literature is dedicated to the role of government in the bus service industry. A view that bus service should be regulated is established on the “*Mohring effect*”. Herbert Mohring (1972) developed a concept that has later been used as a strong ground to justify subsidizing bus service. He believed that transit bus operation involves an economy of scale if passengers’ waiting time is calculated in the cost of transportation. The marginal cost of transporting passengers decreases by increased number of passengers, thus in order to prevent the average cost of transportation from exceeding the marginal cost, a subsidy should be provided to bus service operators.

Many countries across the world subsidize bus operators. According to Estupiñán, Lobo, Raskin, and Serebrisky (2007), urban transport sector in both developed and developing countries receives big amount of subsidies, as in Canada during the 1960s and 1970s subsidies for public transport system reached 30% of the their costs. In large Indian cities such as Delhi, Bangalore, Mumbai and Pune, the majority of transit service is provided by publicly owned companies that operate on soft budget constraints. While the role of the private sector is restricted to providing stage carriages and operating minibuses (P.S.Kharola & Tiwari, 2008). Also in Madrid where urban bus service is provided by *Empresa Municipal de Tansportes EMT*, which is fully owned and operated by the municipality of Madrid, subsidies continue to increase from average 323 million euros in 1995-1998 to 450 million euros in 1999-2002 to 804 million euros in 2003-2005 (Vassallo, Villar, Muñoz-Raskin, & Serebrisky, 2009).

The Mohring effect established the theoretical grounds upon which a body of literature had evolved dedicated to studying the impacts of deregulating bus service operation. For example, following the deregulation of local bus service in Britain, except London, Peter Romilly (2001, p. 165) found that fares increased by 24% between the fiscal years (1985-1986) to (1996-1997). The immediate reason lies in the cuts of subsidies allocated to modes of mass transit. In that case, the increase in fares is not necessarily reflecting an inefficient market or a failure of deregulation, but rather an economic correction for a system that was operated through inefficient market mechanism. Thomson (1992) used time series analysis to observe the changes in supply and fares of buses from 1977-1990 following the urban bus deregulation in Chile. He found that bus fares had increased substantially, however, the supply of different types of busses (buses, minibuses, taxi buses) also increased dramatically. Fernandez and Munoz (2007) used a mathematical model to analyze the outcomes of urban buses privatization in Britain, Sri Lanka

and Chile considering the number of operators, frequency of service and passengers' valuation of time. Though, their findings suggest different outcomes for each of the countries studied, they suggested that perfect competition cannot be achieved in the bus service industry and thereby it should be regulated.

On the contrary to that approach, other research found that deregulating bus service would bring more benefits to the society. For example, in a study by Teal and Giuliano (1982) found that bus service deregulation will not lead to an increase in fares, a finding that nullifies a key argument of the regulation supporters. In their research based on case studies of seven large American cities, the authors concluded that private bus service can generate profits even if they charge the same fare charged by regulated public buses. Put it another way; with urban transport privatization, fares will remain the same. The justification lies in the assumption that private operators have lower operating costs than public agencies. This is because of the ability of the private sector to utilize labor and capital in a more efficient way. This finding was further supported by Mizutani and Urakami (2003). Using an econometric model, they found that private bus operators in Kansai region in Japan performed far better than the public operators due to the efficiency in terms of wage, costs and service production. The model suggests that the total operating cost for the public sector operators is 20% higher than that for the private operators.

Estimating the cost of operation either to identify the optimal bus fare or to determine the amount of subsidies was another major area of contribution. For example Jorgensen and Pretson (2003) developed a model using cross sectional data from 138 bus companies in Norway to estimate the short, medium and long term marginal costs of bus operation and found that the actual bus fares are too high for short trips and too low for long trips.

Williams (1979) developed a production function of bus operation where the inputs are fuel and labor. He then used cross sectional data from bus companies whose fleet size is above 25 buses and estimated the short run costs to derive the long term costs. He concluded that with increased output (more miles travelled) marginal costs tend to fall indicating an economies of scale.

Farsi and Fetz and Filippini (2007) went further and suggested that urban transportation is characterized by economies of scale and scope. Using a panel data set of companies operating different transport modes in Switzerland, they estimated a multi output cost function and concluded that there is synergy among modes of transportation that is better achieved by having multi-mode company. In addition the estimated cost function indicated a return on scale on every level of output, if combined together a suggestive evidence for a natural monopoly.

Turvey and Mohring (1975) noted that in order to determine the optimal bus fare, marginal cost should not only include operating costs but also the social costs borne by passengers. Social cost is mainly a function of travel time that includes both in vehicle and out of vehicle time. Since each passenger is increasing the travel time of other passengers, full buses or busy routes have higher marginal costs than emptier ones and hence should charge passengers higher fares.

Notwithstanding the arguments of literature praising transport privatization and deregulation, the government intervention in transit bus market seems to be indispensable. The main issue is how regulations are designed in such a way that creates the right mix between the public and private transit bus operation, and what are the different modes of cooperation between

both that contribute to providing a quality service that responds to the diversified demand of commuters.

2.3 Urban transportation in Egypt

With regards to Egypt, few efforts had been dedicated from economists or policy analysts to the study of urban transportation or the bus service particularly. To my knowledge there is a dearth of academic contribution on urban transportation in Egypt. The contributions come mainly from international organizations. Though mainly deal with urban transportation in general rather than having a precise focus on commuter buses, they provide the necessary background and the basic needed information to understand the situation and the challenges of the sector. For example, the World Bank (2000) attempted to assess the impact of urban transport policy on the urban development of Cairo by examining supply and demand in relation to the newly established towns between 1971 and 1998. The study examined the different urban transport modes and the users of each one of them, however the data it relied on is too old that in the current context it lost its relevance except for giving an understanding about the development of urban transportation in Cairo. In “*Greater Cairo: a proposed urban transport strategy* (World Bank, 2006) multiple issues pertaining to urban transport are covered such as traffic management, road pricing, different modes of urban transport like Heliopolis tram and metro.

Even though, two pieces of literature are of a high importance. The first is a comprehensive study developed by the Japanese International Cooperation Agency JICA (Japanese International Cooperation Agency [JICA], 2002) entitled Cairo Regional Area Transportation Study (CREATS). The study which was conducted upon the request of the Egyptian Government in November 2002 is a comprehensive study that includes a master plan

and a feasibility study for some priority projects. The huge study that comes in four separate volumes utilized data collected from a sample of 57000 home based surveys with trip makers over two and half years. Although, the study is comprehensive in nature, it is dated since the data it includes was collected at the beginning of the study in early 2001 which is almost 14 years ago. The other significant literature is the Cairo Traffic Congestion study conducted by the World Bank (World Bank, 2010). Although the study contains very useful information and data about different modes of urban transportation including buses, its main focus was on the causes, types, locations and the economic costs of traffic congestion.

A very recent piece of literature pertaining to the regulatory environment of urban transportation in Cairo is contributed by Ramadan (2014). Though the study explores and explains the problems of urban transport planning in Cairo, its main focus is on the operation of minibuses and the expected resistance of its operators to new transport projects.

In light of that, this thesis will attempt to fill a research gap by focusing on bus service operation which has been neglected in the literature. Also, by using qualitative methods in collecting and analyzing data, the research will bring a deeper understanding of what the people really needs and what their problems are.

CHAPTER 3: CONCEPTUAL FRAMEWORK

In a free market, with multiple producers and consumers who interact freely with a minimal government intervention, the price will be adjusted automatically at an equilibrium point where all market participants (suppliers and buyers) will be satisfied and therefore maximizing the market efficiency. Proponents of free market economy believe that government intervention represents a distortion to that efficient market mechanism. However, they believe that the ideal market outcomes maybe compromised as a result of monopolistic actions of a producer, the presence of externalities, or the existence of asymmetric information that hinders consumers rationality. Therefore, the government is sometimes obliged to intervene using its regulatory powers to prevent the market from falling. The government then uses a set of policy tools to stabilize the market and help achieving its most efficient outcomes.

On the other hand, in a centrally planned and state controlled economies, the one size fits all approach does not respond to various tastes and values that the different consumers have and thereby deeply distorting the market performance by excluding potential consumers. Thus, both extremes are not desirable; government excessive intervention and government total withdrawal.

This thesis assumes that any market including bus service cannot function without the presence of the government. Even in a market- oriented economy, the government intervention is necessary for the well-functioning of the market. In addition, governments intervene and regulate to create equity, or in other terms to help and assist those who are economically marginalized.

There are a variety of policy tools at the government's disposal, the most important of which are subsidies or taxes. These two are the most effective regulatory tools as they entail a positive or negative financial incentive. Subsidies benefit their recipients but they are also

disadvantaging others. A tax reduces the profits of a firm or the income of an individual, however it reverts back to them in the form of a provision of a public good or building the necessary infrastructure for businesses and people. Thus, any government regulation has winners and losers. The decision on when, how and to what extent regulation may be employed should then be a one that includes as much involvement from the stakeholders as possible, and to be based on evidence and accurate cost-benefit calculations.

Historically urban transportation has been an attractive market for the government to regulate. Subsidies given to public bus operators are common in different countries. These subsidies assist public operators to finance their spending on purchasing new buses, maintaining the fleet, expanding their service to remote areas and in a broad sense improving the service. But it remains very essential to question the quality of service provided and whether it responds to the demand or not.

On the other hand, privately operated buses also benefit from the government spending as they exploit public infrastructure and facilities implemented and financed by the government such as roads and sometimes, as in Cairo, are allowed to use public bus terminals and stops.

The government of Egypt in addition to subsidizing the public transit operator, it uses price control which is a highly effective, yet a controversial, regulatory policy tool to keep the bus fares of both the privately and publicly operated buses at low levels that are affordable to poor segments of the society. But price control does not always work in favor of the consumers. On the contrary, sometimes when there is a price ceiling, potential producers may be expelled from the market. As a consequence the demand of some consumers will not be met. Also, when the services provided by the government are subject to price control, the quality may deteriorate

and government agencies may accumulate budget deficits since they are unable to generate revenues that cover their expenses.

Thus, in assessing whether a government regulation is hindering the market or not, one should look at another important factor that determines the demand in a given market which is the willingness to pay for transportation. Current bus passengers may be willing to pay more for the existing service and even some potential passengers may be willing to enter the market and start riding public or private buses if a better service is provided. In that regard, an incremental increase in fares will not necessarily bring a sharp fall in demand. It could be even argued that higher fares may increase the demand as a result of new market entrants who were voluntarily excluded due to the low service quality.

The elasticity of demand explains the assumption that the exiting bus riders will continue using the service with a slight increase in fares. Commuters have inelastic demand on urban transport in general and bus service in particular. This means that the percentage change in demand will fall in a lower percentage than the percentage change in price. This is a consequence of the relatively few substitutes or transport alternatives that one has. If an individual does not use bus transportation, what are other means to commute from one place to another?

Moreover, it is very important to understand that the price is not the only factor that determines the demand on any good or service. So in the case of bus service, commuters also highly value convenient ridership. Convenience does not have a single definition, however it could be interpreted as any variable that makes a passenger's trip more pleasant, favorable and efficient one.

CHAPTER 4: METHODOLOGY

Given the lack of literature contributed on bus transportation in Egypt, this thesis relied primarily on semi structured interviews with the concerned government officials and commuters in Cairo. Data and information presented and analyzed in this thesis were collected by interviewing eight of the Cairo Transport Authority officials as well as two from the Ministry of Planning. The interviewed CTA officials were senior staff belonging to the Department of Financial and Economic Affairs, Operations Department and Technical Affairs Department. In the Ministry of Planning, I interviewed two senior officials from the Transport Sector who are in charge of CTA projects.

In examining the effect of government regulation on the level of service and passengers' convenience, nine in depth interviews and a focus group with four participants were conducted with commuters who ride different modes of public transportation through the period from 2nd of February to 6th of May 2015. Although it cannot be claimed that the participants are a representative sample of the whole population, we selected commuters who do not own cars and cannot afford to take a taxi and thereby their choices are limited to mass transit modes that include public buses. The interviews were semi structured to create a comfortable environment for the informants to talk freely and to express themselves without drawing conversation borderlines. The interviews took place at the informants' workplace and the average interview took one and half hour on average. The findings of the interviews defined the thesis structure as it was found that convenience is a broad theme that may include travel time, reliability and comfort.

Assessing the impact of regulation is difficult, as there are always conflicting stakes involved; whenever there is an interest for a group, other groups will be hurt. Moreover, it requires accurate information and reliable data to measure the costs and benefits. Therefore, it was attempted to draw on the few available data and resources and also to build upon the findings of the interviews and the focus group discussion to identify what the passengers are looking for in an urban bus service and how they rank their urban transport needs, and to measure their level of satisfaction with the current market structure.

Although quantitative analysis is widely used in transport economics research, it was very difficult to obtain the necessary data to construct an economic model to measure the marginal cost of operation, travel time or other economic variables that could be useful for the research. The necessary data is simply not available and even the existing data is either misleading or not reliable. For example, the number of passengers who ride CTA buses are measured by the number of tickets sold, neglecting the fact that a lot of passengers ride for free and do not purchase tickets, as will be elaborated on in Chapter Five. In addition, the data on passengers reflects the aggregate numbers without specifying the trip of each rider such as how many get on from each stop, making it very difficult to select a sample for analysis.

The same problem exists for cost calculation. The cost of transporting one passenger is not calculated based on the cost of operating busses but rather by dividing the total expenditures of the CTA by the number of passengers, and therefore it was very difficult to know the marginal cost upon which the fare price should be determined.

Notwithstanding the significance and relevance of quantitative analysis, qualitative analysis generates deep understanding and a detailed description of the problem under

examination by allowing the informants to voice their opinions. It helps in exploring different dimensions of the problem and to get closer to the people's perceptions and feelings which sometimes cannot be gleaned from quantitative analysis.

While qualitative research cannot produce generalized assumptions, I believe that the findings of this research do not depart from the existing literature about the problems of urban transportation in Egypt and worldwide. However it opens new areas of further analysis and research as will be elaborated on in Chapter Seven: conclusion and recommendations.

Ethical considerations

At the beginning of each interview, the informants were briefed about the purpose of the interview and were informed that all the collected data and information are intended to be used solely for conducting that research. Also, they were offered a consent letter written in Arabic and signed by myself indicating the thesis's title and that all data and information will only be used for the thesis.

The informants were also informed that their participation in the interviews and the focus group was voluntary and they have the right to refuse to answer any question or to terminate the interview at any time. No monetary or any other form of compensation was offered to informants and all the names mentioned in the thesis are not the informants' real names. All government officials and two commuters refused to tape the interviews.

Study Limitations

There are very few academic sources about the topic in Egypt either from online resources or universities' libraries. In addition, the CTA itself does not have a website where the

basic information can be obtained. Thus collecting the basic information and data required conducting six visits to the CTA headquarters and one visit to the Ministry of Planning.

As expected from the beginning some of the CTA officials were reluctant in providing data and information. Although they were aware of the purpose and the exclusive use of the data we were collecting for research, they tried to provide as little information as they can. It was clear that they fear that any information they provide might be used against them. One CTA official told me “ *every now and then somebody comes to us and ask for detailed information, I am hired by the government to do only what I am doing, why I am supposed to waste all my time on giving somebody information. We are not compensated for helping researchers or doing extra work*”. He added “*once a lady from the World Bank came here and spent a week collecting data we did not know what she did with all what she got afterwards. She asked about the salaries and wages of the employees , what would happen if she revealed such information to the press and we found ourselves in trouble?*” Even though, I managed to get some useful data about the fleet size of the CTA, the number of employees, the amount of government subsidies, that are presented in Chapter Five.

Furthermore, the time, financial and legal constraints made it difficult to conduct a survey on passengers of public busses to measure their level of satisfaction. A representative sample of bus riders is expected to be huge and therefore will be very time consuming. Also, bus riders can be found in a bus stop either waiting for the bus to come at any time or arriving to their destination making it even more challenging to hold them to fill a survey.

CHAPTER 5: URBAN TRANSPORTATION IN CAIRO

Commuting in Greater Cairo is a real challenge. The city ranks thirteenth among the mega cities around the world and with a population of nearly 20 million it is also one of the most populous cities in the world (The United Nations Development Program [UNDP], 2007). The size of Egypt's capital is expanding due to the establishment of new urban neighborhoods, but the population growth along with the high migration rates reduce the space making it one of the highest population density in the world (United Nations Alliance of Civilizations [UNAOC], 2010). This situation creates traffic congestion that everyone in Cairo suffers from. The government of Egypt is aware of such a problem and therefore it attempts to expand its urban transportation networks to respond to the increasing demand of commuters. The public expenditures on transportation that far exceeds its revenues indicates the government's intention to provide better transportation services regardless of the profits generated. This is a very common practice among governments all over the world as urban transportation has positive externalities that contribute to the economic performance and thereby it is subsidized and supported by the government.

5.1 Government spending on transportation

In the state budget of the FY 2013-2014, subsidies granted to public transportation in Cairo and Alexandria fall under the Fourth Chapter of the budget item "Subsidy, Grants and Social Benefits", the government allocated EGP 1,434 million to passengers' transportation, a 17% increase from the 1,223 million which were allocated in FY 2012-2013¹. In addition, EGP

¹ Annex (2) Detailed distribution of uses and resources for State's General Budget of according to Administrative Classification

2,673 million were allocated to the purchase of means of public transportation representing 8.7% from the total expenditures on the purchase of goods and services under Chapter Two “The Purchase of Goods and Services” which were distributed as follows²:

- EGP 1 billion for the central administration.
- EGP 1.454 billion for the local administration.
- EGP 218.8millions for services authorities.

Furthermore the government invested EGP 189.3 million in the purchase of non-financial assets distributed among (central administration 144.1 million and services authority 45.2 millions). This number was 155.3 million in FY 2012-2013. These assets did not include the purchase of any means of public transportation.

Meanwhile the allocated funds for maintenance of communication and transportation together were 324 EGP millions.

On the household level, according to the income and spending national survey conducted by the Central Agency for Public Mobilization and Statistics (CAPMAS), the average family spends 5.2 % (1,308 EGP annually) from its income on transportation more than their spending on education (4%), culture and entertainment (2%).

5.2 The car dominance culture

Almost all studies about urban transportation agree that among different modes of urban transport, using one’s own car is considered the mostly preferred mean of commuting. In

² Table 3 (B)- Uses (Second Chapter) Purchase of goods and services- State’s General Budget 2013-2014.

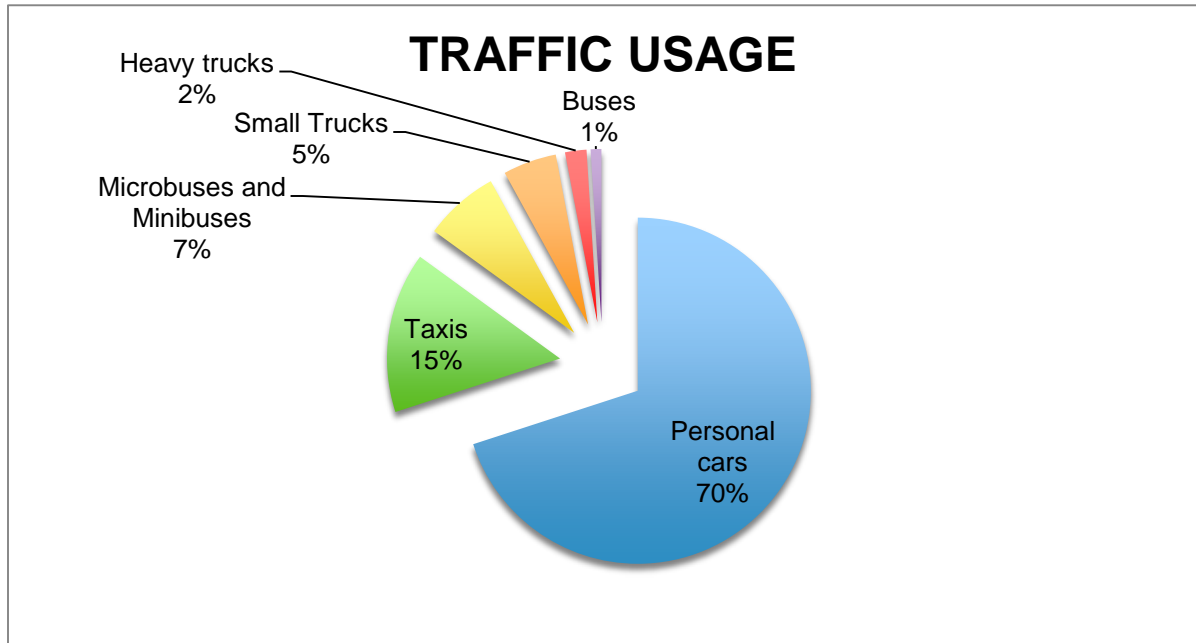
addition to giving the commuter the freedom to go anywhere at any time, it also gives her/him the personal privacy in her/his own property.

Automobile makers know this fact pretty well and consequently they invest trillions of dollars each year on research and technology advancement so that cars are currently safer and equipped with sophisticated options and amenities that give the driver a great experience and enjoyment. Passenger car ownership in Egypt is still lagging beyond many other developed and even developing countries. According to the World Bank data (World Bank Group), in year 2004, out of every 1000 Egyptians, only 27 people owns a car which represents 2.7% of the population compared to 446 in every 1000 in the USA, 561 in Canada, 136 in Brazil, 92 in South Africa, 83 in Tunisia, 80 in Turkey, 57 in Algeria and 47 in Morocco. Another way to interpret this percentage is to say that over 97% of the Egyptians have to use other modes of public transportation.

However, in Cairo the percentage of car ownership is almost five times more than the national average, 115 people in every 1000 or 11.5% of Cairo residents (Japanese International Cooperation Agency [JICA], 2002).

This may partially explains the traffic situation and chronic congestion in Cairo compared to other governorates and cities in Egypt. The share of private cars in road traffic as shown in Figure 1 is the highest among all other modes of transportation in Cairo as it constitutes 70% followed by taxis 15%, minibuses and microbuses 7%, small trucks and heavy trucks 5% and 2% consecutively , while large buses only represent 1% of the overall road usage (World Bank, 2010).

Figure 1: Traffic usage in Cairo



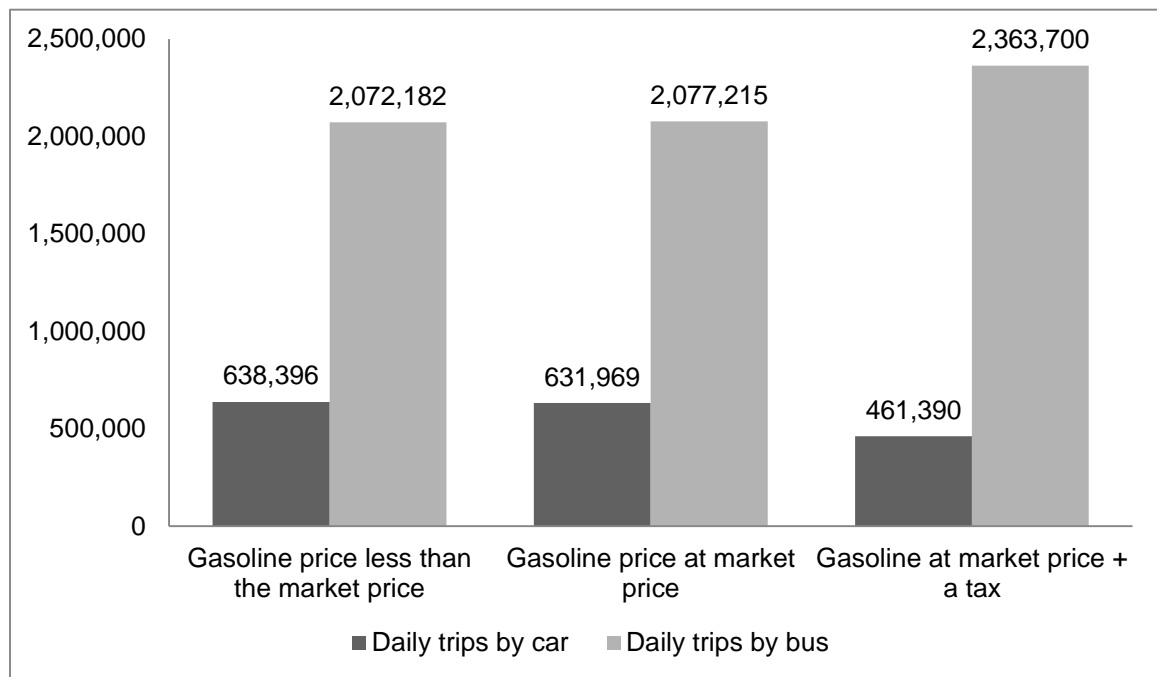
Source: World Bank Cairo traffic congestion study- Phase 1

The same World Bank's study (2010) calculated that the average speed during the morning peak which extends from 7 am to 9 am to be from 20-45 km/hour while in the afternoon peak it drops to be from 15-30 km/hour.

In spite of that, when the people can afford, they prefer to use their own vehicles rather than resorting to the use of other modes of urban transportation. Automobiles sales reached 300,000 vehicles sold by the end of 2014 (2014: A year above expectations, 2015). But still in a country where more than 30% of the population lives under the poverty line and where GDP per capita stands at 3,341 EGP (World Bank), not everyone can afford to buy a car. In addition, the poor quality of roads, the absence of proper traffic management and more importantly the gradual gasoline subsidy reduction, demand on urban transport continues and is expected to rise. Furthermore with the rapid urban sprawl and the diversity of economic activities, people are no longer living in isolated localities, but rather they live in one place, work and shop in different

places. For that reason they rely on public transportation to be able to move from one place to another. In particular, the assumption that demand on modes of urban transportation will increase as a result of fuel price increase was one of the findings of the comprehensive study on transport in Cairo conducted by the Japanese International Cooperation Agency (2002). JICA developed five transport scenarios to anticipate demand on transportation classified on different modes of urban transport. Two of these scenarios estimated that fuel prices will remain the same and the other three estimated it to be less than the market price but more than the existing price at the time of conducting the study, at the market price, and at market price in addition to a tax. According to these scenarios, daily personal trips using bus or a private car are shown in Figure 2

Figure 2: Daily trips using private car and bus according to Gasoline prices



Source: JICA transportation master plan and feasibility study of urban transport projects in Greater Cairo region in the Arab Republic of Egypt 2002

This was explained by the assumption that demand on a service will increase when the price of the substitute service increases. In the case of gasoline subsidy cuts, the cost of operating one's own car will increase and thereby s/he will look for a substitute such as using public transportation.

Generally, using public transportation is considered an inferior good; when one's income increases he will reduce his demand on it. This is true as when someone can afford to purchase a private car he will prefer using it more than using other modes of public transportation. But in Cairo this is even more apparent as modes of public transport are largely described as being of a low quality.

5.3 Modal Options in Cairo

Aside from private automobiles, there are a variety of formal and informal modes of urban transport. Formal modes are those which are licensed and work under the umbrella of law and regulations. They are either publicly or privately operated. Public modes include: metro, buses and minibuses. While the formal privately operated urban transport modes include taxi, minibuses (14 seat shared taxi), privately operated minibuses (Mass Transit Project).

On the other hand the informal urban transport sector is an emerging market reflecting the shortage of inadequate service provided by the formal ones and therefore it requires the government attention and action. There is no sufficient data about the informal sector thus its size and problems cannot be precisely assessed. The leading mode among the informal sector is Tuk Tuk which is a small motorized rickshaw (three-wheeled vehicle) that is very popular in poor neighborhoods and slum areas. Taking advantage of its small size, Tuk Tuk serves areas that cannot be reached by other large busses or minibuses. Since Tuk Tuk are not licensed, there

is no accurate data about its number. However, some reports suggest that number of Tuk Tuk exceeded one million vehicle (Hosny, 2013).

Other informal modes include a seven seat small bus *Suzuki* which works mainly in downtown Cairo and operates on relatively short routes, passengers cars, tour minibuses, and pickups.

The demand on each one of these categories is determined by the coverage of each mode, its availability at different times in the day, the commuters' preferences and willingness to pay, to mention but a few. It was not feasible or desirable to collect much data about all the modes to keep the research focused on the government operated buses. Instead, I will restrict myself to give a brief sketch about the metro and taxi since they offer trans-district mobility as public busses.

5.3.1 Metro It is the first underground system in Africa and the Arab world. It is operated by the National Authority for Tunnels (NAT), an affiliate organization of the Ministry of Transport. The service is available from 5am to 12 pm daily with a single fare system. The price of the ticket is cheap 1 EGP (equivalent to USD \$ 0.13) that can be used for a single trip in all metro lines. It is worth noting that metro is considered by many passengers as the most safe and convenient means of urban transportation for the following reasons:

- 1- The frequency of service: the interval between trains is just three minutes reducing the waiting time.
- 2- The trip duration is the same each time so a commuter knows exactly when he reaches his destination.
- 3- Many trains are air conditioned specifically in Line 3 and some in Line 2 and 1.

4- There are women only cars.

5- The security presence in most stations.

Currently, the metro network includes three lines:

Line 1 which extends from Helwan to New El-Marg, the length of which is 45 km with 35 stations serving two million passengers on daily average.

Line 2 which extends from Shubra El-Kheima to EL-Monieb, the length of which is 21.6 km with 20 stations carrying one million passengers on daily average.

Line 3 phase 1 and 2 from Attaba to Haroun El-Rashid (Heliopolis) the total length is 12 km with 9 stations.

In addition, the work is undergoing in the following:

Phase 3 Line 3 Part 1:(extends from Al Attaba to Kit Kat)

Part2 (from Kit Kat to Rod El-Farag)

Part 3 (from Kit Kat to Cairo University)

Phase 4 Line 3: this phase extends from Haroun station in Heliopolis up to Cairo International Airport with a total length of 15.8 km.

The NAT has a very ambitious plan to extend the metro coverage to distant places in Greater Cairo through line 5 and 6 with a combined total length of 50 km and 41 new stations as shown

in figures 3 and 4.

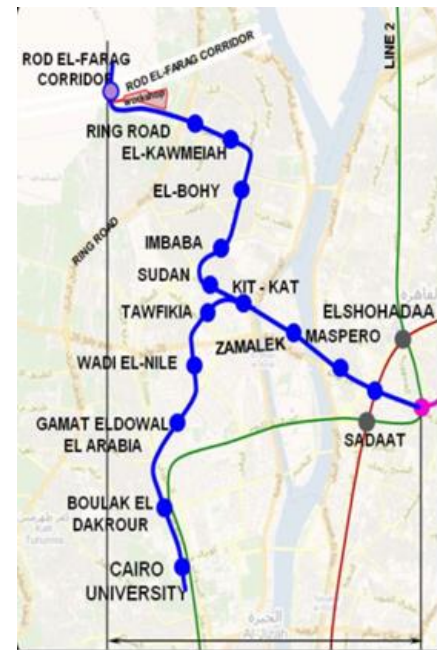


Figure 3 (Metro Line 5)

Figure 5 (Metro Line 6)



Figure 4 (Parts 1,2,3 Phase 3 Line



Source: The National Authority for Tunnels. <http://www.nat.org.eg/english/>

5.3.2 Taxi It is the most expensive mode of urban transport. They are privately owned and operated and do not have specific routes. Taxis are obliged by law to use meters with a starting fee of 3 EGP. According to traffic law no. 121 of 2008 taxis older than 20 years are not allowed to operate. They have to replace their old cars with new ones (The Ministry of Finance). In practice, licensing a taxi is very difficult as the government is no longer offering plates for taxis so if anyone is willing to operate a taxi he has to purchase an old one which costs on average from 40-60 thousand EGP regardless of the condition of the vehicle. In addition, taxis are forced by law to renew their vehicle license annually.

In 2008 and after the promulgation of the traffic law, the government embarked on the taxi replacement scheme through which taxi owners whose taxis are 20 years old can replace

their vehicles by new ones by turning their old vehicles to the Ministry of Finance and be granted 5000 EGP to be used as a down payment to some contracted Banks and get their new cars and pay the rest on monthly installments (African Development Bank [AfDB]). In addition, the vehicles would be exempted from customs and the Ministry of Finance would also pay sales tax.

5.4 Publicly operated buses

The Cairo Transport Authority (CTA) which is the main entity responsible for operating and regulating bus service in Greater Cairo was established in 1966 by the presidential decree no. 2617 for the year 1966. It is affiliated to Cairo Governorate, yet it is a big organization that has an independent budget and supposed to function on an economic basis. The CTA performs two main functions:

1- Regulating the buses operated by the private sector under the name of Mass Transit Project. The project mainly aims at increasing modal options for commuters in Greater Cairo especially those in remote cities and increasing the revenues of CTA to enable it to maintain its fleet and cover its expenses (Cairo Governorate portal, 2015).

According to this project, private sector companies are contracted to operate medium size buses (26 passengers) on specific routes that are determined by the CTA. These companies are licensed by the CTA and pay annual fees, and they are allowed to use CTA terminals and bus stops. Companies willing to operate on a given route have to fulfill some criteria that include being an officially registered company, all the workers in the company have to have social and medical insurance, drivers have to carry the valid required driving license, the buses are duly licensed, in well condition and have to be technically inspected regularly by the CTA.

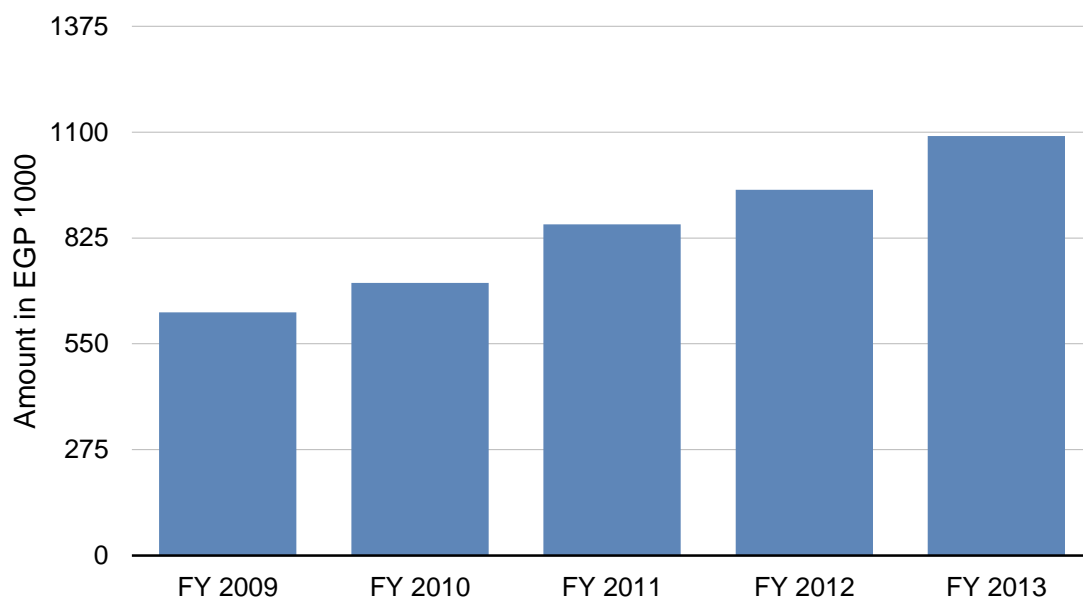
The fares are proposed by the companies subject to the approval of the CTA. On the other hand, the routes are determined by the CTA, and the interested companies may apply to

operate on those routes only. To ensure the compliance with the determined routes and fares, the CTA sends its inspectors to ride on board of those buses. In case of breaching the conditions agreed upon, the CTA may terminate the contract with that company. However, given the few number of inspectors, the CTA is not always able to monitor the compliance or the performance of those privately operated buses. Currently, there are 23 companies operating 1636 buses working on 176 routes and they are generally known for their flexibility and reduced travel time.

2- Providing mass transportation using its large buses, minibuses, river transport and Heliopolis metro, which is currently being phased out .

The CTA receives government subsidy each year that goes to its budget without being itemized into a specific program or project. The amount of this unconditional subsidy increases each year and reached EGP 1.08 billion in 2014. Figure 6 shows the development of the amount of subsidies received by the CTA over the past five years

Figure 6: CTA Subsidies 2009-2013



Source: CTA officials

This shows the government driven by its commitment to provide affordable bus transportation, continues its support to the CTA.

Although the CTA is supposed to be an economic authority that functions on an economic bases to create profits, its accumulative budget deficit reached EGP 2.4 billion by the end of 2014.

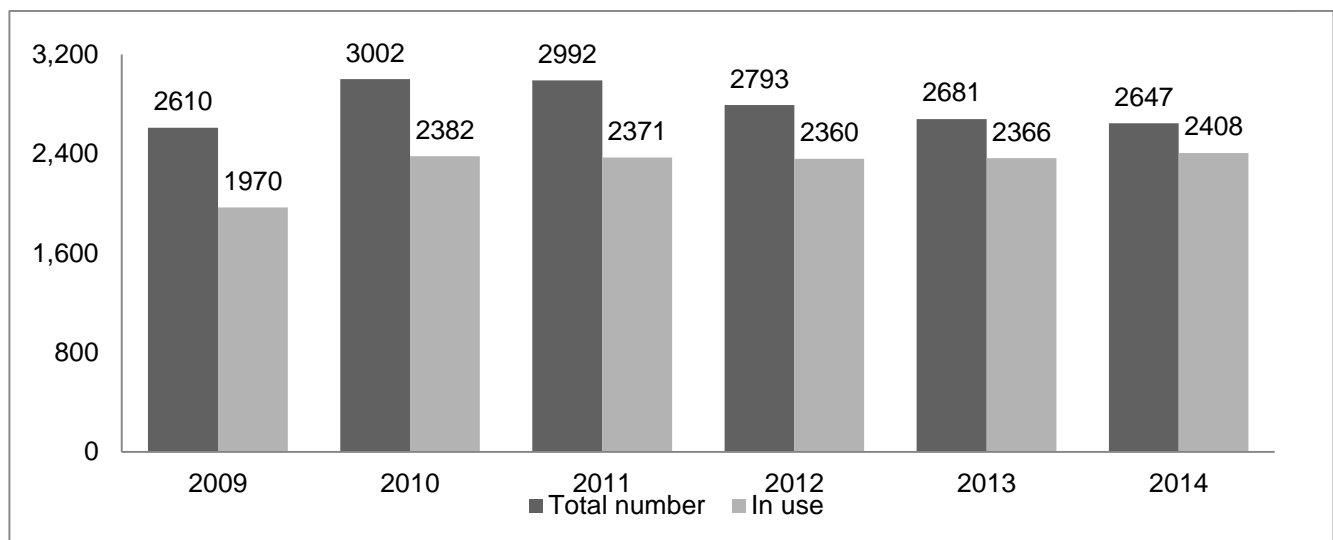
The revenues of the CTA comes mainly from tickets, selling scrap spare parts in addition to licensing fees of the privately operated mini-buses under the Mass Transit Project. Other important source of revenue is selling lands owned by the authority. According to the CTA officials, the CTA is currently in the process of preparing the tender documents to sell the land where the garage of trains used in the Heliopolis metro used to be, and also other pieces of lands will be sold soon in application of the Egyptian Environmental Affairs Agency's decision for environmental considerations as these workshops/ garages where located in residential areas. The total revenues expected are EGP 900 million.

According to the final accounts of the Fiscal Year 2013-2014, the fleet of the CTA consists of 2647 large buses the capacity of each is 52 passengers and 612 minibuses the capacity of which is 29 passengers. While the total number of buses (large buses and minibuses) is 3259, only 2727 are operating and the rest is under maintenance. According to the World Bank data, Cairo has one of the least number of buses compared to its population 231 buses/million (965 in Seoul, 1020 in Sao Paulo, 362 in Mexico city, 636 in Tehran).

However, the updated data collected from the CTA shows that the number is even less (136 buses/million population) given the total number of buses which is 2727 and the population in Cairo is almost 20 million.

This ratio is even expected to fall over the coming years where the demand is expected to increase with the population growth and rising prices of gasoline, while the trend of CTA fleet size tends to be very stable during the last 6 years as shown in Figure 7

Figure 7: CTA Fleet Size



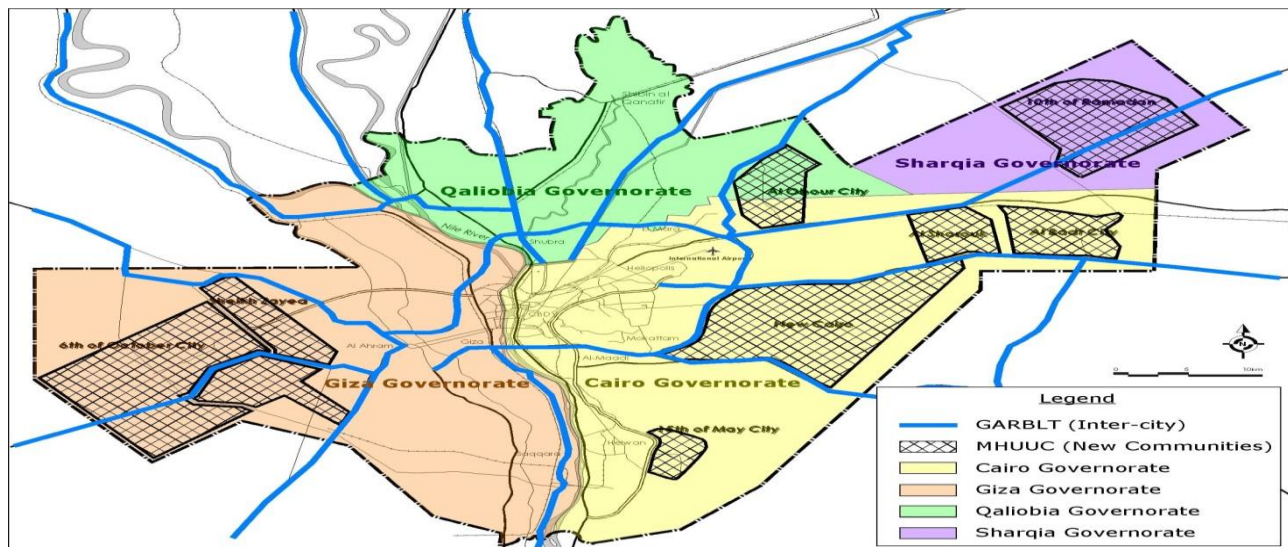
Source: CTA officials

There is a very incremental change (either an increase or decrease) in the total number of busses as well as those in use. Each year some buses get out of service while the expansion plans of the fleet relies mainly on the grants received from international agencies or within a bilateral cooperation agreement. Recently, the Government signs an agreement with Abu Dhabi Fund for Development whereby the CTA will be granted EGP 650 million to procure 600 large buses, out of which 200 were already procured and the rest is planned to be procured before then end of 2015 (Elyazeed, 2015). Even though, the problem lies in the fact that a large number of buses is

very old (manufactured 20 years ago) and were already maintained several times so they have to be replaced very soon.

CTA serves five primary cities in the Greater Cairo Metropolitan Area as shown in Figure 8: Cairo, Helwan, Giza, 6th of October, and Qalyubia. An extensive geographical area of 1709 km². Within these areas, CTA operates 24 bus garages, 5 workshops, and 883 routes.

Figure 8: CTA coverage



Source: CTA officials

5.4.1. How are the routes and stops determined?

In a very broad sense, a decision to operate a new route is taken according to the needs of a given neighborhood. The process starts by a request from the concerned local administrative unit followed by an assessment by the CTA by sending its technical staff to investigate and collect data about the size of population in that neighborhood and the economic conditions of its inhabitants. If it is found that the size of population is large, the CTA will start operating routes to this neighborhood. Drawing the route itself and the bus stops over that route will be determined in consultation with the local unit and the CTA. Although the process may seem

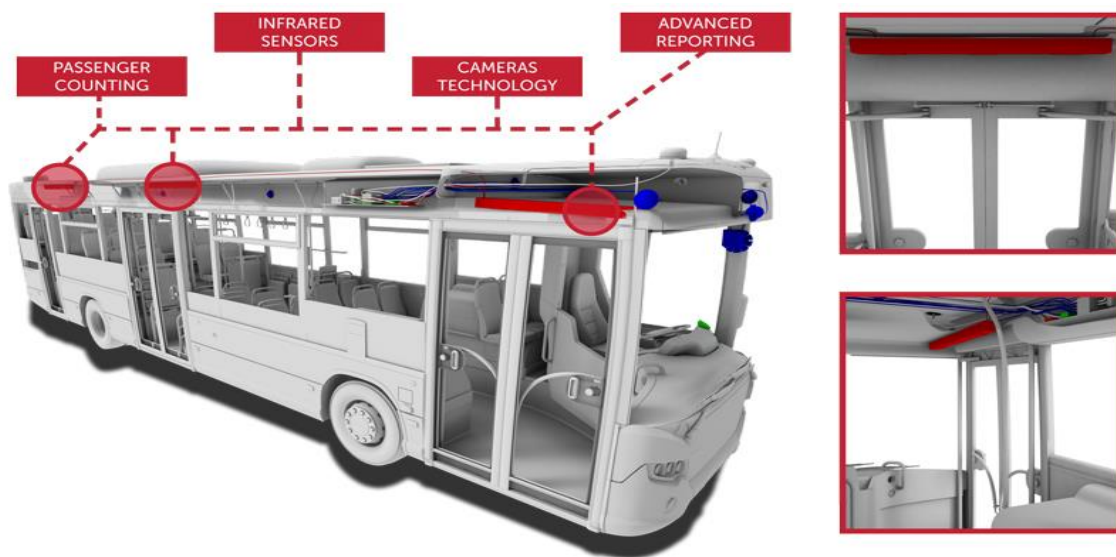
evidence based, the assessment seems to be very superficial. There is no clear definition of what “large” population means. In addition, no cost benefit analysis or any other economic analysis is conducted in order to evaluate the real needs of that neighborhood. Instead, according to the interviews conducted with officials of the CTA, the decision will be most probably taken depending on the power of the concerned local unit head. If he has strong connections with the Governorate officials, he can influence their decision. After operating a new route, it will be determined if it is useful or not by measuring the revenues and number of tickets sold.

It is clear that the problem is that the CTA does not have accurate estimates on the size of demand on buses. The interviewed CTA officials believe that they can never supply the quantity that satisfies the growing demand on buses and there will always be a shortage. As many other public operators in the world (Williams, 1979), the CTA is not allowed to provide the level of output that maximizes its profits, nor to set the price of the service at the marginal cost of production. Furthermore, CTA lacks the qualified transport specialists who can anticipate the demand coming from different segments of the society. And if they actually do, the problem will still exist as the CTA does not use any Automatic Passenger Counting APC system to precisely know the number of passengers who ride transport buses. APC, as shown in Figure 9, is an advanced and sophisticated technology where a device with infrared sensors is installed at the door of a bus to count the number of riders who enter or leave the bus. The device records the number of passengers getting on or alighting at each stop. It provides a detailed and very important data that help bus operators worldwide in the following:

- 1- Determining the level of service for each route and stop.

- 2- Knowing the actual number of passengers who use the bus and also to compare these numbers with the number of tickets sold and thereby enable more monitoring.
- 3- Creating a database that is useful for future planning.

Figure 9: Automatic passenger counting device



Source: www.cleverdevices.com

5.4.2 CTA Organizational structure³

The CTA employs 39,699 employees, the salaries of whom consume more than 63% of its expenditures. In spite of being a huge bureaucracy, the CTA employs only 4,000 drivers of whom 37% are on leave for medical reasons bringing the actual number of drivers to 2,520 to run its 3,259 buses fleet or less than a driver for each bus that is supposed to operate from 6 am to 10:30 pm. Clearly there is a severe shortage in the number of the CTA drivers, but this is not the full story. Drivers are hired on a monthly salary basis in addition to a percentage of the daily

³ The information and data presented in this section were collected from the interviews with the CTA officials.

ticket sales. The basic salary in itself is very low and the commission was historically set at 6% however any sales exceeding 300 EGP will not be compensated bringing the maximum amount a driver can make to EGP 18 daily. The substandard working conditions and the unsatisfactory drivers' pay give rise to a continuous tension between the drivers and the CTA administration. Over time it was further escalated to a wide and very persistent peaceful protest movement led by the CTA drivers who were successful in mobilizing themselves, and engaged in a continuous collective bargaining process with the administration. The drivers employed different methods to put pressure on the administration to respond to their demands including sit ins in terminals and very well organized strikes in most of the CTA garages. The drivers were able to pull a victory by making the administration agree on increasing the percentage of commission to 13% of tickets sold without a ceiling for the daily total commission.

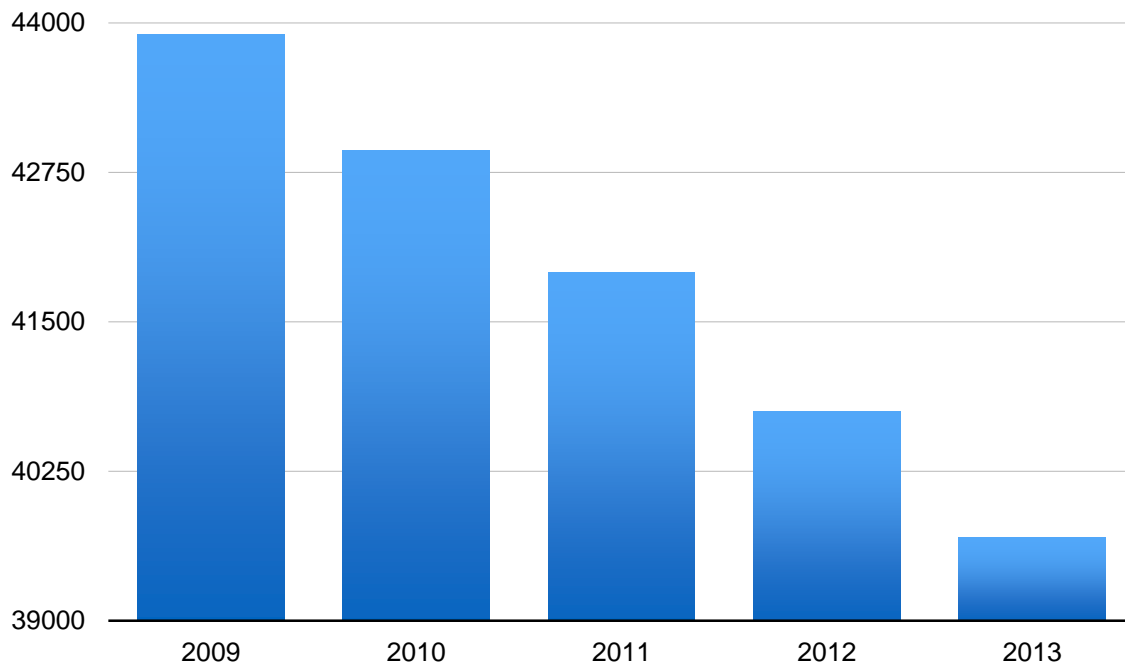
However, a main problem still exists that is related to the route a driver is assigned to. As some routes are heavily used and others are not, drivers prefer the ones with more passengers to make more money, but there is no clear criterion for choosing a driver to operate the route.

It could be understood then that the dissatisfaction of CTA drivers with their working conditions has a negative impact on their working ethics and leads to wasting a lot of time in terminals and thereby causes delays (drivers can easily blame congestion for not arriving on time). On the other hand it could be argued that this has also a good side as, on the contrary to privately operated buses where drivers are better paid, CTA drivers drive slower and safer and consequently reduces number of accidents (Rusco & Walls, 2001).

Apart from the drivers' issues, as a government agency the CTA cannot lay off any employee except for grave administrative violation. So whoever is employed in the CTA as any

other public office will serve his life time there. In the government's efforts to downsize its bureaucratic apparatus, CTA stopped hiring new employees while those who reach the age of 60 are retired. Thus the number of employees is falling but with no much attention given to the adequate staffing of certain departments at the authority nor to the technical qualifications needed to boost the authority's performance. Figure 10 shows the development of number of CTA's employees over the past five years.

Figure 10: Number of CTA employees 2009-2013



Source: CTA officials

5.4.3 Bus Fares

The CTA applies a single fare system. For old buses the fare is EGP 1 while for new ones it is EGP 2, as the old buses are currently phased out, the EGP 2 ticket will be applicable on all

buses and routes. There is no economic or commercial base upon which the fare is determined. The only criterion is keeping the fare equal to or less than the lowest fare of any private operator. This is a rather political and social consideration as to make the publicly operated buses affordable and available for everyone. Thus the CTA does not set the fare by itself, instead, it is determined by Cairo governor after consultation and approval of the Prime Minister.

Tickets are purchased on bus. After each stop, a conductor will go through the bus and start selling the tickets. Although off -vehicle tickets purchase considerably reduces the overall travel time, the method of collecting fares applied by the CTA seems to be better than the traditional fare collection on bus entry for two reasons. It ensures that all riders have tickets as in the case of purchasing the tickets off vehicle may induce some travelers to ride without having tickets. The other reason is that it does not require the bus to stop for every passenger to pay and thereby reduces the stop time. On the other hand, it increases the operational cost of every bus as in addition to the bus driver, a conductor will be hired to collect fares.

In order to be a profitable business, bus fares should be set at the same price of the marginal cost of providing the service for passenger per trip. However, the CTA does not have estimations for the marginal cost on the short, medium or long term.

It is difficult for the CTA to calculate the marginal cost of carrying one more passenger as there is no accurate data on the number of passengers who ride the bus on each stop and almost no data on the number of passengers alighting at each stop. In addition, the marginal cost should not only include the cost of operating the bus but more importantly to take into account the social costs borne by the riders themselves that include the travel time as suggested by many studies such as (Mattson & Ripplinger, 2011; Sen, Tiwari, & Upadhyay, 2010; Turvey &

Mohring, 1975). Unfortunately, the CTA does not have studies on the social costs associated to using public buses, and even if it does I believe given the traffic congestion that causes considerable delays in bus arrivals and the few buses available to serve a particular route, the cost of riding the bus will be very high. Instead the CTA applies a very simplistic method to calculate the actual cost for passenger ride; dividing the total expenditures on the total number of riders. The total expenditures of the CTA on the large buses in the FY 2013-2014 was EGP 1.24 billion while the number of passengers was 188 million bringing the cost per passenger to almost EGP 6.6 which is a totally noncompetitive price if compared to the fare of privately operated buses. For minibuses, the expenditures were EGP 139 million while number of passengers was 27.82 million which means that according to the calculations of the CTA, the cost per passenger is EGP 5.

On the other hand the fare revenues from large buses is EGP 181.7 million and from minibuses EGP 28.85 so that the revenue per passenger is EGP 0.97 and 1.04 respectively.

The huge bulk of the CTA expenditures goes to salaries and wages which was 1.14 billion out of 1.8 billion or 63.3% of the total budget.

On the other hand the data on number of passengers using the number of tickets sold could be misleading. Although by law only two categories are legally permitted to ride free: people with disabilities and families of the martyrs and injured of the 25th of January revolution (Zahran, 2014), some other passengers on a customary basis do not pay fares. This includes army and police personnel, CTA staff and their families, and some street vendors who get on buses to sell their products.

5.5 A note on the effect of Price Control on service quality and loss in consumer surplus

5.5.1 Price control and the market of bus service

Price control is one of the most important and influential regulatory tools that the government utilizes to create certain economic and/or social outputs. By fixing the price of a commodity or a service, the government determines the amount of supply and demand.

In a perfect competition market, prices play the most important role in determining the quantity of goods sold. A supplier will produce the amount of goods that maximizes his profits by setting the price at his marginal cost, which happens to be the same amount of money that the consumer is willing to pay to get this good. When the government intervenes and fixes the price, some suppliers will find a business unprofitable and thereby withdraw from the market. This will create a loss in the consumer surplus as consumers who were otherwise willing to procure the good will subsequently withdraw from the market.

The main aim of a price ceiling is to make the good or service in question affordable. However, decreasing the supply while the demand is high, will lead to shortage that will followed by rationing and also deterioration of the quality of the good or service produced.

The effects of price control could be chaos as described by Galbraith in his famous work “A theory of price control” (Galbraith, 1952) since price fixing takes away the function and the meaning of price and thereby it will not reflect the real value of the good.

The same logic is apparent in the market of bus service in Cairo. The government enforces the CTA to keep the fares at a maximum of EGP 2 to make it affordable to a wide range of commuters specially poor segments of the population and thereby the CTA accrues a chronic

annual budget deficits. Even though, the CTA faces a fierce competition from other privately operated modes of transport specially minibuses (the 14 seat shared taxi) which although are more expensive, they attract more clientele due to the more frequent and reliable service they provide indicating that passengers may be willing to pay more for a better service.

The 1998 Household survey (World Bank, 2000) shows that riding the CTA buses tends to be negatively correlated with income. Although a relatively old data, I believe it holds true for the present time reflecting the nature of buses as an inferior good that with an income increase its demand curve will fall.

Table 1: Use of motorized transport per household income category in 1998

Income level per household per month	Shared taxi	CTA bus	Metro	Private car	Taxi	Bicycles and motorcycles
Under 300 EGP	38%	28%	16%	7%	2%	1%
300-500 EGP	33%	23%	19%	13%	4%	0%
500-1000 EGP	24%	15%	19%	25%	6%	0%
1000-2000 EGP	14%	7%	14%	39%	11%	0%
More than 2000 EGP	8%	3%	7%	57%	13%	0%

Source: World Bank urban transport strategy review- The case of Cairo- Egypt

As shown in Table 1, the majority of well off people whose monthly income exceeds EGP 2000 at that time will prefer to use their own vehicles and only 3% of them uses CTA buses. But this raises another problem associated with price control that is the loss in consumer

surplus. The government attempts to provide affordable bus service to the poor by fixing the price, however it neglects the fact that some other segments of the population may be willing to pay more for an improved service as demand on bus service does not only come from the poor. Evidence from Europe (European Commission, 2012) tells us that there is a growing demand on different modes of public transportation specially buses. That growth is not only attributed to the population growth but also as a result of increasing economic activity, urban mobility and a direct result of improvement in public buses that attracted new passengers preferring to avoid congestion and parking cost in city centers.

In that regard, and with the rising prices of gasoline as a result of the government gasoline subsidies cuts, it is expected that some car owners will prefer to find other alternatives. Following the rule of demand “demand on goods will fall when the price of that good increases”, some people will forcibly leave the market of operating a private vehicle. Those people who cannot afford to follow their usual private vehicle usage patterns, they will either sell their vehicle entirely or reduce its usage and they will most probably be new entrants to urban transport market. However, other private vehicle owners will stick to using their cars as a result of the elasticity of demand. Driving a one’s own car has an inelastic demand. That is the percentage increase in the cost of operating the vehicle will be higher than the percentage fall in people driving their cars. So many car owners though are financially hurt from such an increase, will not be able to stop or even to reduce the usage of their private vehicles, again because of the few substitutes those people have.

A relatively closed and highly regulated market restricts supplier or service providers options to just a few which leads to a loss in consumer surplus. This means that potential

consumers are not entering the market to use bus service because they do not find the type of service that they are looking for. If the market is otherwise competitive with multiple service providers, or if public operators are allowed to set the price at the marginal cost of production, it is more likely to supply a wider range of quality service that responds to different sets of consumer demand and thereby a car owner may decide to stop driving and use modes of urban transport.

If the current bus service is designed to meet the demand coming from certain socioeconomic groups, mainly the poor, car owners on the contrary may be looking for different kind of service.

Car owners spend a considerable amount of money in commuting. They pay a lump sum amount in buying a car and incur the running costs for operating it, such as buying gasoline, parking, fees, insurance, maintenance, cleaning etc. When gasoline prices soar, the cost of commuting will move in the same direction. Although the cost is an important factor, it is inevitable to say that money will not be the single concern for a car owner to stop using his car.

So, it is very essential for the government to develop some tools to anticipate the future demand on buses that may occur due to different factors including the change of the operating cost of other alternatives. More importantly the characteristics of the potential new market entrants should be studied so that regulations will be adjusted to reflect the changes in the market or actually to respond positively to those changes that happen on the demand side. A car owner is used to plan his daily activities freely because he has his mean of transport at hand. S/he may decide to go anywhere at any time using a convenient and safe mean of transport. So, any alternative for driving his own car in order to be examined should give her/him the same, or

close, degree of reliability, safety and convenience as long as the cost is equal to what they used to pay with the old gasoline prices or less than the cost incurred with the new prices.

5.5.2 Price control and self-rationing

Price control is usually accompanied by rationing policy as to limit the demand and to make sure that the commodity in question is available for the consumers. However, in the market of an inferior good “public transportation” we can assume that there is no need for a government enforced rationing because the market is self-rationing.

In Egypt everyone can ride any means of urban transportation and pay the same fare. Since the system is largely subsidized so we can conclude that urban transportation in Egypt is provided on a universal subsidy system; it is not targeted towards specific social or economic group. The reason is clear, no one will ride a public transport means unless he does not have any other alternative because the service is of a low quality that anyone who can afford to use better and more convenient mode (private car or a taxi) will definitely do so. The system is then considered self- rationing.

5.5.3 Price control and supplier-consumer coalition

A major problem associated with price control is the lack of strong and efficient mechanisms that enable the government to monitor the market and make sure that the service providers comply with these fares. Suppliers and service providers, over history, had multiple ways to charge above the price ceiling. This is also apparent in private buses in Cairo, as micro buses do not usually comply with the fares set by the government. They sometimes divide the route in order to get a double fee. The interesting thing is passengers are willing to pay that extra fee because they are wise and rational enough to know that they do not have any other options.

From one side if they refuse to pay they will not be able to move or to arrive at their destination. Furthermore, they base their decision on a cost benefit calculation, so if they decide not to take the bus and complain, the amount of money and effort they will pay will exceed the extra fare they pay. There is a kind of mutual consent between service providers and passengers to not pay the fixed fare and they implicitly agree to pay the market price. Galbraith (1952, p. 4). called this a collusion that runs against the government regulation This shows that the passengers are sometimes willing to pay more in return of a better service quality.

CHAPTER 6: TRAVELERS' CONVENIENCE

The market of transit bus is just as any other market has two main participants : suppliers of the service and consumers. The demand on bus service is determined by many factors, the leading of which is the price that determines the quantity demanded at each price point. The relationship between price and quantity demanded is negative linear relationship; with an increase in price, quantity demanded should fall. However the percentage of decrease in quantity demanded is subject to the nature of the good or service in question; the elasticity of demand. Elasticity of demand itself depends on the nature of the service; whether it is a necessary or luxury. Furthermore, price elasticity of demand is affected by the presence of a substitute service and whether or not the service in question is complimentary to other services. When we consider the bus service, we find that, for those who ride the bus, it is a necessary service and also it is essential for attaining other goals such as going to work, school or anywhere else.

Many studies have found that urban transportation and specifically bus transit has inelastic demand; with an increase in price, demand will hardly fall and on the other hand with a decrease in price demand will not necessarily increase (Brown, Thompson, Bhattacharya, & Jaroszynski, 2014; Sinha & Labi, 2011; Schmenner, 1976). This indicates that price is not the only factor that a passenger considers while making a decision to take a transit bus.

A wealth of literature suggested that bus ridership is also very sensitive to reduction in travel time. Many studies on Bus Rapid Transit (BRT) systems concluded that the system attracted more segments of the society other than the conventional bus riders. For example, in (Bocarejo, Portilla, & Pérez, 2013) it was found that demand on riding, *Transmilenio*, the Bus

Rapid Transit in Bogota, grew at 12% on average during the implementation phase, and in three years between 2007 and 2010 demand grew at 27% on average. This is justified in part by the considerable travel time reduction that occurred due to the secluded lanes that BRT buses travel through.

It should be assumed that a commuter is rational when it comes to his choice between different available and affordable options. S/he knows what exactly s/he is looking for and calculates the costs and benefits associated with each pursued option. Lisco (1970, pp. 43-47) put that rationality in an interesting way when he described how a typical American commuter behaves *“If he drives, he knows all the tricks. He times traffic signals to the second, follows special routes at different times of the day, and he has pinpointed the location of every speed trap. Altogether, he has carefully thought through the task of getting to work in order not to lose a second’s time. and if he uses mass transit he “knows the minute he must leave home in order to catch his bus or train. He also knows where to stand in order to catch the car that offers the greatest likelihood of finding a seat or lets him off nearest his exit at the station”*

Thus in making a decision to take a bus, a rational traveller usually considers some variables that maximize his commuting utility. Since commuters’ preferences are not the same as they do not have the same travel demands, these variables differ from one person to another depending on his socioeconomic status (the willingness to pay), reasons of making a trip (necessity or luxury) tastes, and alternative modes of transport (the existence of substitutes).

Travelers’ Convenience is traditionally assumed by policymakers to be the ultimate goal they seek to achieve when planning and implementing urban transport projects (Wardman, 2014). Convenience is defined in Merriam Webster as “a quality or situation that makes

something easy or useful for someone by reducing the amount of work or time required to do something”. Still, it is a very generic term, the interpretation and limits of which differ from one person to another. The ambiguity of the term “*convenience*” was described by Berry, Seiders and Grewel (2002, p. 2) as follows “*Convenience is acknowledged to be increasingly important to consumers, yet no known research has defined the service convenience construct or examined how it is evaluated. Although most researchers and managers consider service convenience to involve more than locational proximity or hours of operation, the specific types of service convenience have not been established*” .

In light of that and based on the findings of the focus group and the interviews conducted, I suggest that commuters’ convenience include some variables that affect their decisions about modal share. The leading among these variables, that will be discussed in the following sections, include travel time (in vehicle and out of vehicle), accessibility (hours of operation, stops location), reliability and comfort. All these variables are strongly correlated to each other, for example reliability is a function of travel time and accessibility, and also travel time is a function of accessibility, however I will attempt to draw some distinctions among them.

6.1 Travel time

Travel time is perhaps the most fundamental variable in making a decision to take the bus (Brunner-Brown, 2013; Mohring, Schroeter, & Wiboonchutikula, 1987). In a modern society where the people are engaged in multiple range of activities, they need to move from one place to another as fast as possible. They highly value their time and wish if they can have a full control of the surrounding circumstances to reduce the wasted time.

Given the expansiveness of Greater Cairo and its chronic congestion, travel time is a serious issue for commuters.

6.1.1 In- vehicle and out-of-vehicle time

Travel time consists of two parts: in-vehicle time and out-of-vehicle time. The former refers to the time spent when a traveller is actually on board of bus, while the later literally means the time a passenger spends outside the bus which includes walking to/from the bus stop from/to place of origin or destination, waiting time at a bus stop and transfer when needed.

Many studies suggested that a passenger usually places a higher value on out-of-vehicle time than in vehicle travel time (Cherlow, 1981; Gentile, Nguyen, & Pallottino, 2005; Metz, 2004).

As the case is such, a typical commuter usually tries to reduce the out of vehicle travel time as much as possible. S/he can manage to do so by knowing exactly the bus schedule and calculating the time needed to reach the bus stop on time. Unfortunately, a bus schedule in Cairo seems to be a myth.

“I may wait for the bus for more than one hour in the morning and never know when exactly it will come, it is supposed to arrive every half an hour but since this route had started four years ago it never came on time”. These words were said by Nader who spends 5-6 hours daily on commuting from home to work and vice versa. He lives in El Shorouk city and works in downtown Cairo. *“I am used to go back home late every day, it does not matter anymore, the government is happy to tear the ties among family members by making me spend most of my time commuting”* he added.

Nader’s situation seems to be very plausible. A simple calculation may verify his words. The working fleet size of the CTA is 2408 buses and there are 883 routes, which means on

average 2.72 buses per route. The distance from El Shorouk city to Downtown Cairo is 50 km, given that the average speed during the morning peak is on average 32 km/hour, which means a bus every 68 minutes⁴. When I asked Mohamed who lives in Imbaba and works in downtown about the accuracy of the bus schedule he laughed and said *“I never know that the bus has a schedule, and if there is a schedule no one knows it, how can I know it, I know that in foreign countries buses have schedules but this is because these countries are developed, they respect their people but here the bus driver wants to rest in the terminal and drinks his tea then start working”*.

6.1.2 Bus stops

Bus stop is another major determinant in the overall travel time. It is normal that the bus should stop to pick up passengers and drop riding passengers to their destinations. Although having more bus stops over a route reduces the out-of-vehicle time that a commuter spends, it may considerably impact the in vehicle travel time of the passengers on board (Ceder, Butcher, & Wang, 2015; Ibeas, dell’Olio, Alonso, & Sainz, 2010; Schuurman, 1987). So it is the concern of bus operators to reduce that time as much as possible.

The time spent at each stop adds up to the overall travel time and it does not only include the time taken by riding passengers to alight and waiting passengers to ride, but it also includes the time taken by the bus itself to decelerate before the stop and accelerate from it before joining the traffic. Thus it is better not to stop simultaneously in each stop, but only when there are waiting passengers at the bus stop or when a rider requests getting off by pushing a bell to notify the driver.

⁴ Dividing the distance (50 km) by the speed (32 km/h) then multiplying it by 60 minutes= 93 minutes per trip. In order for the bus to go and come back it takes 186 minutes. dividing by the average number of buses for the route the result will be 68 minutes

In Cairo, bus stops represent a chaotic feature of bus operation. Many of these stops are not properly marked but rather they are customary stops that only frequent bus riders know their location. In addition, the majority of designated stops do not have shelters or a bus schedule. Although buses should only stop at designated stops, the practice shows that drivers may stop upon request at any place to drop off a passenger or for a pedestrian to get on. In addition to increasing the probability of causing accidents and congestion, this *hail and ride* approach followed by bus drivers increases the overall travel time. Nadia told me *“we know that a driver does it out of benevolent intentions, but frequent stopping wastes a lot of time, drivers sometimes overdo this, he may stop five times between two stops, every passenger wishes if the bus would drop him in front of his house door”*

But the case seems to be even worse as the buses do not only stop for the sake of riders. Some drivers are reckless and their attitude may also count for delays and increase travel time. Sobhy who lives in Qalyub and works in Attaba told me *“One time I took the CTA bus and the driver stopped for almost half an hour to buy bread, the passengers were very angry at him but he shouted and said what do you want from me, I want to take lunch”*, he added *“the driver sometimes stop the bus at the terminal and have a break with their colleagues and drink tea and if we ask him he pretends as if he is not the driver of that bus.”*

When I asked the CTA officials about stopping in undesignated stops and the drivers' working attitudes and carelessness, they said that the CTA is very aware of such a problem but they do not have any magic solution for it. The number of the CTA inspectors is very few and there is no way to make sure why the bus was late for its schedule as they lack any tracking system. Drivers usually blame the traffic congestion. In addition, the drivers, as the CTA official

explains, are trouble makers they organize strikes and do not hesitate to use violence against the employees of the Authority.

Other contributors to the travel time include the fare collecting system and the bus design. Off- vehicle ticket purchase reduces the time spent at each stop specially if there is a large number of passengers who get on in specific stops. Also, having designated doors for boarding and alighting makes it faster and easier for passengers. Although CTA tickets are purchased on board of bus, the presence of a conductor helps in reducing travel time than if the bus was a *driver- only operation*.

Regarding the design, CTA buses are large ones that have two doors; one in the front and one in the back. It is supposed that passengers get on from the front door and alight from the rear. Nevertheless, passengers will get on and off from either specially if the bus is crowded a passenger will get off from the front door if it is closer to her/him.

6.2 Reliability

Reliability is one of the most important factors that determine a passenger's decision about modal choice. Reliability means that the bus comes on time everyday according to its schedule so a commuter can easily plan his activities ahead.

“It comes by chance, I can never plan my day relying on government buses”. These were the words of Mohamed who lives in Imbaba and works in downtown Cairo. Imbaba is one of the most inhabited neighborhoods in Giza and supposed to be served by a number of CTA buses, however he does not trust that the bus may come on time. *“Unless I will take the bus from a terminal I will never wait for it because simply I do not know when or where it comes”*. Mohamed spends about EGP 10 daily to commute from home to work and vice versa. He uses

two minibuses in each trip. He prefers to take only one bus without transfer specially in the morning but the unreliability of buses prevents him.

The uncertainty about the bus schedule definitely affects ridership. In the morning peak, commuters' trips are consistent. People go to work at the same time every day and consequently they organize their lives so that they wake up and leave home every day at the same time. Following the same travel pattern and using the same modal option is therefore preferred to most commuters. Any unpredicted change is therefore undesirable and can hardly be accommodated.

So a commuter may find it better to use a more expensive mode should it be more reliable like Khaled who lives in Faisal and works in downtown Cairo. Khaled uses a privately operated minibus to take him to the metro station then he rides the metro to work even though there is a bus terminal five minutes- walk from his house. *"The minibus once is full it moves and sometimes the driver may even leave with two empty seats, but the bus is not guaranteed, it may not leave the terminal even if it is full"* he said. His decision to transfer between two transport modes and paying about EGP 4 instead of the EGP 1 for the CTA bus indicates that reliability is very important to him.

Reliability was also a major concern for Heba who lives in Qalyub, a city located 25 Km north Cairo and works in downtown. *"The problem is that if I arrive late to work they will deduct from my salary and they do not care that I live so far and the bus comes late"*. She does not have a problem in catching the bus in the morning but the main problem as she perceived it is that the bus may not leave the terminal on time and then she does not have any other option but to wait for the driver to move. Her trip takes from two to two and half hours so she has to take the 7 am bus otherwise the next one will arrive at 8 and make her late to work.

There is no real time bus arrival/departure display screens in the bus stops or terminals. So the problem is not only that the bus does not arrive at the schedule time but also a passenger maybe waiting without knowing when the bus will come which leads to more uncertainty and unreliability. Furthermore, when a bus arrives at a terminal there is no precise departure time and it depends more on the driver. *“You can always see a group of drivers and conductors sitting in the terminal eating and drinking tea and the buses are full, if you dare and ask them when route no... will move they will shout and tell you don’t you see that we are eating?? you cannot argue with them they are very high tempered and they usually fight with passengers and with each other”* Sobhy said.

A vehicle breakdown is another associated variable with reliability. The CTA fleet contains a lot of old buses which are not replaced on a regular basis due to financial constraints. Instead they are maintained in the CTA workshops. This explains why a number of buses are out of service. Some buses maybe delayed due to some mechanical problems. Others may be carrying passengers and have to drop them. *“ Once the driver talked with the conductor and told us the bus breaks are not working and we have to take the bus to the garage and you all have to get off here. I personally did not believe him and others passengers too but many others believed him and feared that the bus may have a crash. What can we do for him in that case? if we fight with him we will be accused of fighting with a public employee during doing his official job and if we complaint nothing will happen”*. Saleh said.

6.3 Accessibility

The government intervenes in the urban transport industry and the transit bus market so as to make the service available for almost everyone. So the issue of accessibility is very critical to enable as many commuters as possible. It is normal that buses work on particular routes and

according to a schedule that is not tailored for a specific group of commuters. It is understood that passengers' travel behavior differ, and a bus operator cannot satisfy all the passengers' needs or tastes. However, since the CTA covers an extensive geographical area, the level of service specially the operating time should be more responsive to the needs of each area given its unique features and proximity to the city center. The CTA follows the one size fits all approach when it comes to the operating time as the buses work from 6 am to 10:30 pm regardless of the locality they serve. Schedules should not be the same for all routes specially routes which serve distant areas since the residents of those areas travel longer trips and have fewer alternatives.

6.3.1 Operating time

Saleh who lives in *Salhya* in *Toukh* city 45 Km north Cairo and works as a support service staff in a government agency in downtown Cairo has to be at work as early as 7 am. *"I wake up at 4 am every day and leave home maximum by 5 am. I take a microbus from home to El Kanater and from there I take another microbus to Tahrir and from Tahrir I take a third one that drops me about 10 minutes-walk from work"*. One CTA bus can save Saleh all the hassle, however it starts operation at 6:30 and since the trip takes two hours on average he cannot take it. In addition , for a man whose monthly salary does not exceed EGP 1500, paying EGP 8 to commute from home to work is quiet high specially if compared to only 2 EGP for a CTA bus.

"For your knowledge the place where I live in Bashtil is not far, it is like downtown but they make it very far" In the past there was bus no. 104 that goes from Bashtil directly to El Attaba but then they suddenly cancel it although it was always very crowded"

Nadia used to take only one CTA bus from her home in *Bashtil* to work in downtown but after the route was shortened she now takes a microbus from home to *Imbaba* and then she either

takes the CTA bus or a microbus to her work in *Attaba*. Instead of paying only one pound, she now pays about EGP 3 which is not main concern for her but rather the transfer and the extra time she has to spend in the morning. When I asked her if she took any action to know why the route was shortened or actually why she did not complain, she said that nobody will listen and she does not want to get in trouble or hassle.

The case even seems worse on weekends. Laila lives in *Attaba* and works in downtown and prefers to go walking. But she and her family used to visit her father in law who lives in *Mokattam* every Friday after Friday prayers and get back in the evening. *“The taxi is expensive for us so we have to take the bus but the problem is that the route from Attaba to Mokattam does not work on Fridays so we have to take a microbus”*. *“They use us, those microbus drivers are gangs, they know that we do not have other options so they increase the fare as they wish”*

6.3.2 People with disabilities

Operating time is not the only accessibility issue, but also the elderly and people with disabilities may suffer a lot in riding CTA buses. The CTA fleet is not designed to allow access to people with disabilities especially those with mobility problems. Busses have high floor entries and three big steps with no extendable ramps making it nearly impossible for people using wheelchairs to get on. In addition, there are no facilities on board of bus to assist people with disabilities. Also for the blind or people with visual or hearing impairments, there is no audio announcement or visual display to notify the passengers with the next stop so they know they reach their destination.

In 2014, the CTA announced that ten special buses for people with disabilities were added to its fleet that work on only eight routes (Al-Ahram, 2014). Unfortunately, this a very

small number given that the number of persons with disabilities in Egypt is estimated by the UN to be around 12 million (Plan International) which is more than 10% of the population, this includes approximately 1 million blind and other 3 million with visual impairments (World Health Organization [WHO]).

In addition, it neglects the fact that the disabled people in Egypt are not clustered in certain areas but live and work everywhere in the greater Cairo area.

6.4 Comfort

Feeling comfortable while riding a transit bus has a significant impact on a passenger's decision to take the bus, particularly for those who can afford a better service. From buying lavish/luxurious cars to booking business class in trains or airlines, many people all around the globe are ready to pay a big sum of money to have more comfortable and enjoyable traveling experience.

In Merriam Webster Comfort is defined as *a* state or situation in which you are relaxed and do not have any physically unpleasant feelings caused by pain, heat, cold, etc. So comfort in a transit bus is somehow a very broad and vague term that could be translated in a number of ways. It implies a number of qualities that are present in vehicle and out of vehicle such as the condition of waiting areas, shelters, bus interior and exterior, cleanliness, seats, the bus floor etc. (Litman, 2015). The overall experience of riding a public bus in Cairo can hardly bring this sense of comfort. The issues of accessibility, reliability and travel time are strong factors for comfort. In addition there are other important variables that affect the degree of comfort such as the frequent stopping, sexual harassment, theft incidents, overcrowd to name just a few.

Another important discomfort concern relates to weather conditions. Egypt has a hot desert climate with an average high temperature 36 degrees in July and August and above 30 degrees other six months during the year (Wolrd Weather online), however only very few number of CTA buses are air conditioned and they work on a very limited number of routes.

“I may die in summer if I ride the CTA buses, I am relatively an old man and have diabetes and in hot days or in Ramadan I never think about it”. Nader told me. The problem in the bus is that it is very hard to find a seat, unlike the minibuses where the driver will immediately leave the stop once he has a full bus they cannot accommodate more passengers so I always have a seat.

Typically a bus transit passenger prefers to sit specially if the trip is relatively long. Being seated has a number of advantages, he is less vulnerable to bus movement specially when the bus stops or accelerates, in addition a seated passenger may spend his time doing a complimentary activity like reading, listening to music or even taking a short nap (Leurent, 2009). Furthermore, bus setting will lower the probability of being harassed by other passengers or to be stolen.

“I will never take a bus unless I know I have a seat”. Heba who lives in Qalyub and works in Downtown said. She prefers to take the bus that goes the opposite direction and increase the travel time so that the bus will unload in the terminal and then she can find a seat. Furthermore she pays a double fare, but for her it is worth it because the trip may take up to two hours and she is not welcoming the idea of standing all that time.

CHAPTER 7: CONCLUSION AND RECOMMENDATIONS

It is a common practice among many governments all over the world to regulate the urban transport system. The term regulation here does not refer to an exclusive control from the government over the sector or the impediment of market forces, but rather as an effort to organize the market and to make it work in favor of the citizens. The government of Egypt, driven by its commitment to provide affordable urban transport, plays the role of the service provider of transit bus as well as the market regulator. Through the publicly owned Cairo Transport Authority (CTA), the government attempts to enhance people's mobility. The government supports the CTA through a generous subsidy package that reached above one million Egyptian pounds in 2014. The CTA as an institution struggles to provide a quality service. However, it is heavily burdened by the common bureaucratic problems. From overstaffing problems to the inability to function on a commercial basis, the CTA cannot fulfill the government's promises to provide a quality service. The CTA is not empowered to determine the bus fares which falls within the Prime Minister's domain of authority. Its staff are public servants who enjoy powerful position that make them immune from being laid off. Hiring new employees requires special complicated administrative procedures preventing the CTA from recruiting a highly qualified caliber who are strongly needed. All these reasons account for a poor quality bus service. A small fleet size and a shortage in drivers reduce the service frequency. A weak incentive system also reduces the drivers' motivation to work more efficiently or enthusiastically. Few buses work on each route increasing the out -off vehicle time and thereby increases passengers' dissatisfaction. In addition, buses are usually overcrowded

making the trip a very uncomfortable experience and leading to discouraging potential passengers from using the bus.

With demographic changes and the changing commuting patterns, the supply of public bus service should be diversified in order to meet the growing and changing demand (European Commission) .The old one size fits all approach is no longer appropriate. Commuters' preferences varied considerably according to travel needs and aspirations, all of which are guided in principle by the passengers' willingness to pay.

The findings of this thesis suggest that passengers are willing and they actually pay more than the actual CTA bus fares when commute using other modes of transportation. Although price is important factor for modal choice, they seem to value travel time, reliability, comfort and accessibility more than money and hence they sometimes resort to other options than the CTA bus to arrive to work on time or to save themselves some time. Also, the CTA adopts a one size fits all approach by providing a uniform/standardized type of service that fails to respond to the diversified travel demands of wide range of commuters.

7.1 Policy recommendations

Reforming bus service should be pursued within a larger context of reforming urban transportation system. Urban transportation problem is a very wicked one, in such a way that fragmented actions can hardly bring solutions. It is not about to regulate or deregulate but rather to put a long term strategy developed upon evidence based research and accurate data. In addition, citizen participation and community engagement should be an integral part in any future policy.

1- Downsizing the CTA by reducing the number of employees to decrease the agency's expenditures on salaries and wages and to stabilize its financial balance. In addition to increasing the number of drivers, hiring inspectors to ride on board of buses to make sure that the drivers exert their fullest effort to arrive on time and do not stop randomly at any place is necessary.

2- Instead of subsidizing the CTA as an institution, the government should start thinking about subsidizing the passengers directly to prevent subsidies leakage. The large portion of CTA's expenditures funds its staff wages and salaries. In that scenario, fares should be set on a commercial basis. This will require having a market segmentation strategy to identify different types of current and prospected passengers. Those who are considered poor and cannot afford other modal options will receive subsidies while others will use the CTA bus by paying the actual commercial fare.

3- The CTA fleet should be renewed and upgraded by introducing more environmental friendly buses with lower pollutant emissions. In addition to buses with high comfort levels.

4- Since it is not always feasible nor economic efficient to designate special buses for people with disabilities it is better to make all buses *easy access* buses. There are some facilities that allow the elderly or people with disabilities to ride on board of all buses. These facilities include bus ramps or wheelchair lifts, priority seats in the front of the bus, bus stop announcement system, bus stop pushes, handrails and route number display.

5- Adding real time information about arrival and departure time so as to give the passengers the necessary information for making their decisions as a passenger may be willing to make a quick

purchase or s/he may decide to change mode if he is in a hurry. This should also be coupled with a responsive complaints system to reporting excessive bus delays.

6- Since on time arrivals, though very crucial for a commuter decision to take a bus, cannot be guaranteed given the high congestion, the CTA in close consultation with other urban transport stakeholders should give more attention to transferability by connecting modes of urban transportation and establishing more transit centers where a passenger can transfer from one bus to another or from one mode to another (Iseki, Taylor, & Miller, 2006).

7- Since the CTA covers a large geographical area that includes three governorates, a multiple fare system should be introduced rather than the single fare system. The greater Cairo region may be divided into zones with a ticket for each zone.

8- Opening a communication channel with bus riders by introducing riders satisfaction scorecards, questionnaires and surveys. It sends a strong message to the people that the government needs to listen and thereby increases citizens' satisfaction and also it enables the CTA to understand more about the passengers' preferences and needs. So planning the service will be based on what the people actually needs.

9- Using automatic passenger counting system to have accurate figures about the number of passengers getting on and alighting at every stop. Using such data is essential in policy making regarding where to locate bus stops, service frequency, and to take any future decision about route termination or continuation.

10- A special note on introducing a Bus Rapid Transit BRT scheme

It is a bus based form of mass transit system that functions within a dedicated bus lanes. BRT is not just a normal bus service that runs in separate lanes, but a very unique system that has its own identity and requirements. It is a complete system that has a special design, shelter, vehicles, fare payment methods that aim at moving people conveniently and at higher speed. A United States Government Accountability Office report (GAO) (2012) indicated that ridership has substantially increased within one year of implementing BRT projects and that they reduced the average travel times of 10 to 35% over previous bus service.

BRT started in Curitiba Brazil in 1974 but then was spread in many other developed and developing countries. Many countries had developed BRT system with some differences such as many cities in the USA, India, China, South Africa, Indonesia, France, Sweden, Thailand, UK, Columbia. In Africa, *Lag Bus* was the first BRT system to start working in Lagos Nigeria. However, the most successful experience was that of the city of Bogota in Columbia known as the *Transmilenio*. *Transmilenio* started its operation in December 2000 and within few years it achieved great success by cutting air pollution by as much as 40%, decreasing traffic collisions and pedestrian accidents by 94%, injuries to passengers by 76%, and fatalities by 94%. In addition people with disabilities were able to ride the buses unlike other conventional buses (Gilbert, 2008).

Although not as fast as light rail, BRT has gained more popularity among policy makers in the recent decades as it is considerably cheaper and requires less time to build than rail based mass transport systems. It can be between 4 and 20 times cheaper than an equivalent Light Rail

Transit (LRT) system and 10 to 100 times cheaper than a metro system (Tao, Corcoran, Mateo, & Rohde, 2014).

Despite its merits and the advantages it brought to the cities that implement BRT projects, a BRT scheme has some difficulties and challenges. Given its sophisticated nature and technical requirements, there are some difficulties that constitute some planning and implementation difficulties. Still introducing a BRT system may help in addressing the transportation problems in Cairo by reducing travel time and improving reliability, accessibility and comfort, and Egypt can learn and glean lessons from other developed countries that implement such a system.

7.2 Further research

- Further studies should be conducted to estimate the marginal cost for transporting passengers. This is necessary to be able to calculate the optimum fare. However this is not attainable unless accurate data is collected on the number of passengers per day, per ride, per route and the distance travelled.
- Academic and research attention should also be given to the CTA as an institution that needs to be reformed and empowered. Its organizational structure, staffing, drivers' working conditions and pay system, governance and finance are very fresh areas for research enquiries.
- Qualitative analysis is also very important to understand the riders' perceptions about the bus service and to measure their satisfaction and travel demands and aspirations.

ANNEX 1: FOCUS GROUP AND INTERVIEWS

Questions for commuters

When do you use the bus?

How do you get from home to work?

How you describe your experience in using CTA buses?

Do you know the bus schedule? and do the buses come on time?

What makes you prefer other modes of transport on CTA buses?

How much do you spend on daily commute?

Questions for CTA and Ministry of Planning officials

- What are the criteria used to anticipate future demand?
- How participatory the process of regulation making is? How are the routes determined?
- What are the CTA's plan to attract new passengers?
- How does the CTA evaluate the performance?
- What are the requirements for market entry? How much subsidies given to the industry?
- Is there a need for private sector involvement?
- Does the CTA use any kind of technology to measure number of passengers such as Automatic Passenger Counters?
- How are the fares determined? and is there any intention to modify the single fare system?
- Is there any kind of coordination with the private operators to better serve the passengers?

ANNEX 2: CONSENT FORM (IN ARABIC)

استمارة موافقة مسبقة للمشاركة في دراسة بحثية

عنوان البحث : التنظيم الحكومي لخدمة مركبات النقل الجماعي بالقاهرة الكبرى

الباحث الرئيسي: (محمد عبد السلام القرمانى)

البريد الإلكتروني: karamany28@aucegypt.edu

الهاتف: xxxxxxxxxxxx

انت مدعو للمشاركة في دراسة بحثية عن (التنظيم الحكومي لخدمة مركبات النقل الجماعي بالقاهرة الكبرى)

هدف الدراسة هو التعرف علي تأثير التنظيم الحكومي علي خدمة مركبات النقل الجماعي من حيث الجودة والوفرة وراحة الركاب

نتائج البحث من الممكن أن يتم نشرها دوريه متخصصه أو مؤتمر علمي أو ربما كليهما.

المدة المتوقعة للمشاركة في هذا البحث (ساعة واحدة)

اجراءات الدراسة تشتمل على (تتضمن الرسالة دراسة خدمة مركبات النقل الجماعي بالقاهرة الكبرى واللوائح الحكومية المنظمة لهذا القطاع و أهم احتياجات الركاب ومتطلباتهم للوصول الي معرفة تأثير التنظيم الحكومي علي توافر الخدمة وجودتها ومجابهة الطلب علي ارتياد أساليب النقل الجماعي).

لا يوجد أية مخاطر متوقعة من المشاركة في هذه الدراسة.

لا يوجد استفادة متوقعة من المشاركة في الدراسة.

السرية واحترام الخصوصية: المعلومات التي ستدلى بها في هذا البحث سيتم نسبها اليك كما أنها سوف تكون معلنة ومتضمنة في هذه الدراسة. في حالة رغبتكم, لن يتم ذكر هويتكم في الدراسة.

أي أسئلة متعلقة بهذه الدراسة أو حقوق المشاركين فيها أو عند حدوث أي اصابات ناتجة عن هذه المشاركة يجب ان توجه الى (محمد عبد السلام القرمانى).

ان المشاركة في هذه الدراسة ما هي الا عمل تطوعي, حيث أن الامتناع عن المشاركة لا يتضمن أي عقوبات أو فقدان أي مزايا تحقق لك. ويمكنك أيضا التوقف عن المشاركة في أي وقت من دون عقوبة أو فقدان لهذه المزايا.

الامضاء:

اسم المشارك :

التاريخ :/...../.....

ANNEX 3: INSTITUTIONAL REVIEW BOARD APPROVAL

CASE #2014-2015-23



To: Mohamed Abdelsalam Elkaramany

Cc: Mariez Wasfi

From: Atta Gebril, Chair of the IRB

Date: Nov 9 , 2014

Re: Approval of study

This is to inform you that I reviewed your revised research proposal entitled "**The government regulation of bus service in Greater Cairo,**" and determined that it required consultation with the IRB under the "expedited" heading. As you are aware, the members of the IRB suggested certain revisions to the original proposal, but your new version addresses these concerns successfully. The revised proposal used appropriate procedures to minimize risks to human subjects and that adequate provision was made for confidentiality and data anonymity of participants in any published record. I believe you will also make adequate provision for obtaining informed consent of the participants.


Please note that IRB approval does not automatically ensure approval by CAPMAS, an Egyptian government agency responsible for approving some types of off-campus research. CAPMAS issues are handled at AUC by the office of the University Counsellor, Dr. Amr Salama. The IRB is not in a position to offer any opinion on CAPMAS issues, and takes no responsibility for obtaining CAPMAS approval.

This approval is valid for only one year. In case you have not finished data collection within a year, you need to apply for an extension.

Thank you and good luck.

A handwritten signature in black ink, appearing to read "Atta Gebril".

Dr. Atta Gebril
IRB chair, The American University in Cairo
2046 HUSS Building
T: 02-26151919
Email: agebril@aucegypt.edu

A logo consisting of two solid colored squares: a yellow one on the left and a dark blue one on the right.

Institutional Review Board
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