FLEET REDUCTION REFORM OF LEBANESE JITNEYS

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ABSTRACT

Jitneys, locally known as *servees*, are the principal providers of public transport services in Beirut, Lebanon. The system is already privately owned and operated, provides affordable service, and has a considerable share of the travel market. However, one of the major challenges is that the current number of jitneys available in the public transport market exceeds the level needed to serve passenger demand, leading to a situation of destructive competition among jitney drivers. In this research, the authors preview some issues associated with the Lebanese public transport sector in general, and specifically the local jitney system, presenting their development as well as their operational and organizational aspects. A framework for proposed jitney reforms in Lebanon was developed including organizational and regulatory reforms, enforcement, restructuring, financial incentives, assistance in market formation of larger organizations, and encouragement of jitney drivers to respond to operating challenges. A survey was conducted including profiling drivers, their status, finances and job satisfaction, vehicle conditions and operations, and status of operating licence. Next, a financial analysis of the results was undertaken to identify the optimal number of jitney operators that could yield a balanced competitive environment; this included determining the relationship between monthly net revenues, ridership rates, and jitney fleet size. The analysis indicated that while the reduced fleet size can still serve demand available for jitneys, fewer jitneys could translate into more profit per remaining driver, and a positive ripple effect on other service and quality aspects of jitney operations. Finally, the most significant recommendation was for the government to affirm its role in the matter of reducing the jitney fleet size which can considerably improve the profitability of remaining drivers, and hence operations of the system in general.

INTRODUCTION

The Lebanese jitney system is a privately produced public transport service, locally known as *servees*, accounting for about 20% of the overall transport demand in the Greater Beirut Area, which is double of that served by the other public transport modes (Nakkash, 1999). In spite of the advantages brought forward by this jitney system, the sector is facing several important issues. Before the 1975 civil war, there were close to 10,000 licenses issued by the government for jitneys to operate. During the 1990's however, the government issued more than 20,000 additional jitney-operating licenses, an increase that did not correspond to an actual passenger demand in the public transport market. Consequently, increasing the jitney fleet size- while lacking appropriate demand- meant reducing the net revenue made by each driver, which led to a situation of destructive competition among drivers, representing a major problem associated with the local jitney system. This type of competition also appeared to be a catalyst for other problems that reduced the quality of the fleet where drivers attempt to save on their costs by disregarding maintenance and quality measures, and aggressively solicit passengers in order to maintain a minimum level of profit. Additionally, drivers tend to predominantly concentrate on Beirut and its suburbs in search of perceived demand, further increasing the competition amongst them. Accordingly, it can be argued that the most efficient intervention is one that reduces the number of jitney operators in the market.

In this research, the correlation between the economic situation of jitney drivers and both the quantity and quality of the jitney fleet is considered. An attempt is made to identify an optimal quantity of jitney operators that could yield a balanced competition environment. First, the paper focuses on the dimensions and characteristics of public transport, and the development of jitney systems as well as their operational and organizational aspects. Next, a framework for some proposed jitney reforms is presented followed by an overview of issues associated with the Lebanese public transport sector in general, and specifically the local jitney system. Then, a set of proposed jitney reforms in Lebanon, and a proposal of reduction in the local jitney fleet size are included, along with a description of a survey conducted for that purpose and its findings. Finally, a financial analysis of the results and a set of recommendations are presented along with general conclusions and opportunities for further research.

PUBLIC TRANSPORTATION AND JITNEYS SYSTEMS

Since jitneys belong to the public transport sector, the following section includes, first, a brief preview of the main operational and organizational aspects of public transport, then, a preview of the jitney system development, and some operational aspects.

Public Transportation

The major objectives of public transport facilities are to provide mobility and social equity in terms of physical (geographic coverage of services) and economic (affordability of services)

accessibility, along with providing service quality (accessibility, regularity, reliability, safety) (Yagi, 1994). Two **concepts** of public transport services, 'provision' and 'production' are identified. Production deals with the ownership, operation and maintenance of vehicles and infrastructure, while provision includes all organizational-related activities such as regulations (safety, environmental measures, traffic rules, entering and exiting the public transport, fares) and planning activities including acquisitions and investments (construction, extension, and rehabilitation) of infrastructure, decision making regarding types and specifications such as modes, routes, coverage areas (Yagi, 1994).

Generally, public transport systems provide their services under different market arrangements in relations to the concepts of 'provision' and 'production'. One example is the deregulation characterized by no control over fares, levels of service, routes/areas served, entering/exiting the system, while government regulations, if any, are usually limited to safety and maintenance, and, obviously, to the ownership and maintenance of infrastructure (Yagi, 1994).

Jitney Systems

Operations

A jitney is a 5 to 12 passenger owner-operated car, wagon, van or minibus, operating along random, semi-fixed, or fixed routes, with always the possibility of deviations to satisfy costumers, or to avoid congested areas. Jitney fares are usually fixed, generally exceeding those of buses, but less than taxis fares. Additional fees can always be negotiated for longer rides, or for further deviations from fixed routes (Takyi, 1990).

Development

Although jitneys disappeared shortly after their early start in 1914 in the United States, they spread throughout hundreds of cities around the world, especially in developing countries, and even later within the United States. Some researchers have linked the growth of the sector to the perceived rise in transit fares coupled with declining quality of scheduled transit service in terms of network connectivity, inadequate levels comfort and safety, as well as long and increasing waiting and travel times (Golub et al., 2009). Even with many similarities in their operations, jitneys systems still do not all conform to a single physical or legal set of characteristics (Darmstadter, 1980). In addition, some studies of trip purpose have concluded that informal transport is used mainly for non-work activities including shopping and personal business (Cervero & Golub, 2007).

Examples of jitney operations include the Sampans of Hilo, Hawaii, (Cauley & Farris, 1979), the Jeepneys of Manila, Philippines, the Matatus of Nairobi, Kenya, the Publicos of Puerto Rico, the Carros Por Puestos of Caracas, Venezuela (Takyi, 1990), and the Angkutan Kota of Indonesia (Joewono & Kubota, 2007). Such examples indicate that in many developing cities jitney systems serve significant percentages of demand for public transport. For instance, the percentage of shared taxi trips of total public transport trips was reported to be 77% in Alger and 29% in Tehran (Cervero & Golub, 2007). In most cases, the success of

such forms of *entrepreneurial mass transport* is coupled with low private car ownership rates, lack of developed and organized forms of public transport, and high rates of unemployed, and often unskilled, people. It is estimated that in some Asian cities, jitneys employ as much as 20% of total workforce (Kaysi et al., 2001).

Organization

In theory, and when lacking any sort of regulations, a jitney driver can simply be an *individual*, private and independent operator. More often than not, however, drivers sometimes form *associations* amongst themselves, a kind of syndicate that brings service, order and regularity to jitney services (Klein & Moore, 1997). Associations can help drivers maintain insurance and organize maintenance services; drivers accordingly paying periodic fees. They work on regulating the type and extent of competition between individual operators, coordinating fares, operation areas and schedules. Additionally, some associations facilitate capital acquisitions for financing vehicle purchases or upgrades for their members (Kaysi et al., 2001).

Market Arrangements

Jitney operations can fall anywhere on the spectrum between regulated competition and complete deregulation. Jitney operations, vehicle fleet size, fares, and conditions of service can be publicly regulated on the one hand, or largely left to the process of market supply and demand on the other hand (Darmstadter, 1980). The minibus system of Kuala Lumpur, Malaysia is an example of a completely regulated competition. While vehicles in this system are privately owned and operated, their fares, operation routes, vehicle counts, and vehicle standards are all the responsibility of the public sector.

Assessment

Their flexibility, along with off-route maneuvering capabilities, enables performance of jitneys to be dynamic and adaptable. Their informal operations with little governmental regulations relieve the *governments* from responsibilities of planning and subsidizing such systems. Moreover*, operators* enjoy the freedom of setting fares, routes, levels of service, standards, and so forth, ensuring financial returns to their operations, while *customers* benefit from the free competition environment by having acceptable levels of fares and service, if operations are profitable to drivers. However, when such operations are highly informal and lack forms of governmental controls and regulations – lacking entry-to-market regulations for instance - the number of operators increases, causing serious congestion problems, unstructured and redundant operations, and possibly excessive destructive competition among operators. Additionally, since most jitneys operate on a self-supporting basis, there is a general disregard for safety regulations and maintenance requirements in order to save on costs of operation, substantially reducing levels of service (Takyi, 1990).

FRAMEWORK FOR JITNEY REFORMS

Jitneys play an important role in filling a gap in the public transport market since they come into play mainly when other forms of organized public transport cease to serve the available demand. Many governments are challenged to benefit from advantages of jitney services, while attempting to mitigate the negative consequences of their operations. A diagnosis of difficulties faced by any jitney system should precede the stage at which intervention possibilities are considered. An overall relation between challenges of jitney service and possible intervention strategies is presented in Figure 1, followed by a proposal for general jitney systems reforms.
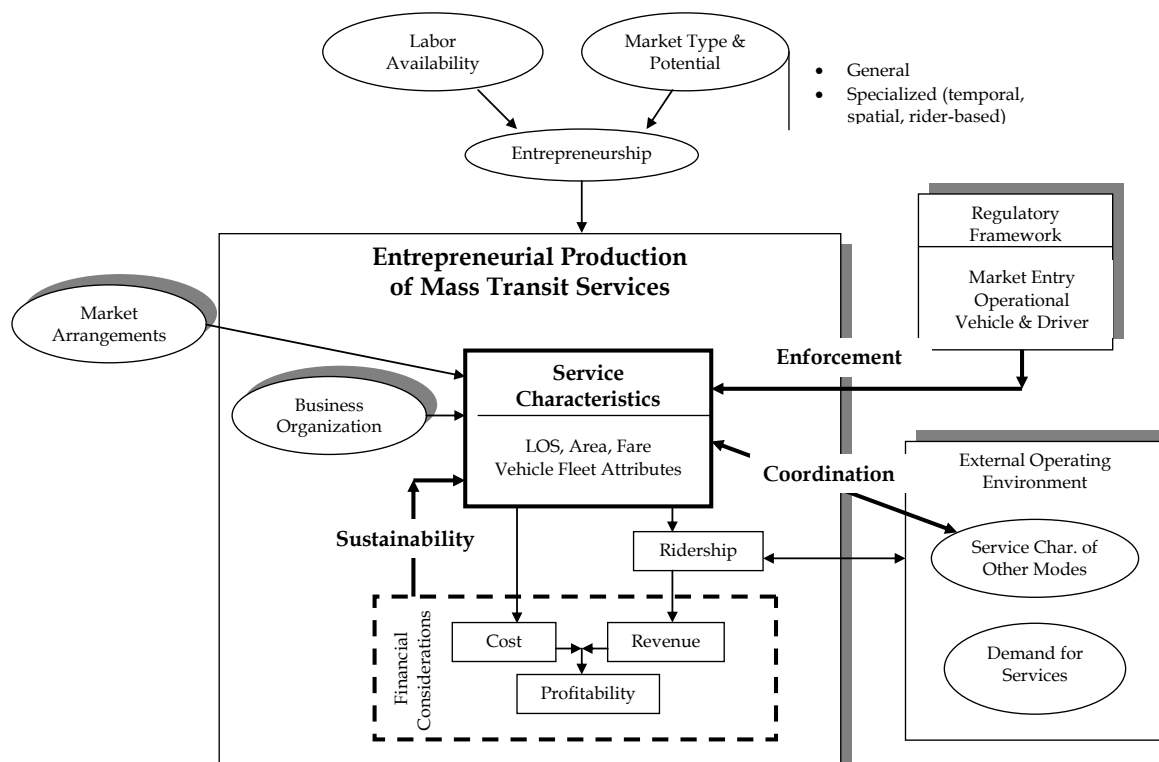

Figure 1 - Relation between Jitney Service Challenges and Possible Intervention Strategies

Regulations, Enforcement and Restructuring

Experiences with individually operated jitney services indicate that market entry regulations as well as clearer regulation of fares, safety standards, driver qualifications, some stability of routes and schedules, and enough organization to provide good public information all seem to be necessary to strengthen the system. Regulation may also involve issuing service concessions to operators such as assigning jitneys to act as feeder services to the bus (or train) system to avoid direct competition (Golub et al., 2009).
However, enforcement of such regulations remains the critical bottleneck in order to ensure that no illegal operation takes place, and that legal jitneys operate within the vehicle, driver, and operating regulations set forth by the government.

It may actually be preferable to focus public sector intervention on encouraging self-regulation through associations, while keeping on-road monitoring and enforcement to the minimum. Moreover, restructuring strategies can intervene in ensuring that jitney services are sustainable in the sense that a stable profit stream is generated from such operations to ensure proper vehicle maintenance, as well as capital accumulation necessary to renew the vehicle fleet.

Financial Incentives and Assistance

The government may intervene by providing financial incentives to jitney owners in the form of excise tax exemptions on purchase or repair of vehicles, lower vehicle registration taxes, and facilities for low-interest loans. The government may also contribute by building terminals for jitney operators (Luyanda and Gandhi, 1989).

Assistance in Market Formation of Larger Organizations

One direction in the context of an individual operator may consist of encouraging the cooperation of different owners in forming associations. Such associations can provide significant advantages in coordinated planning, financing, and maintenance functions associated with the service, as discussed above. The government role in this case would be to encourage formation of such route associations, with a willingness to regulate their existence if necessary. Route associations can contribute to reducing service redundancies in specific service areas and to achieving a better balance between service provision and passenger demand (Cervero & Golub, 2007).

Encouragement of Jitney Drivers in Responding to Operating Challenges

In situations where drivers feel that there are simply too many vehicles and licenses operating in certain markets, some associations have taken the initiative to buy out some of the route licenses, which obviously results in better profitability for the remaining operators.
Another type of response has been manifested in the creation of new, different services, or service diversification, which open up new opportunities and markets for entrepreneurs, and may include, for example, premium services with higher quality, or express services. However, regulation should be flexible enough to allow such service (and fare) differentiation to take place.

PUBLIC TRANSPORT AND JITNEYS IN LEBANON

The Lebanese transport sector was severely affected by the 1975 civil war, especially in terms of the deterioration of organized public transport, and the emergence of a multitude of unregulated and chaotic private operations of public transport services including those of jitneys and private buses (Zeinati, 2001). Currently, the sector suffers from many difficulties. Various ministries, agencies and municipalities share responsibilities, with weak coordination

mechanisms among them, and an unclear definition of their duties. Moreover, Lebanon still has a very high *car ownership* rate compared to any standards (estimated at one car per three persons), and which is expected to increase further (Zeinati, 2001).

Following is a brief description of issues faced by the Lebanese jitney system.

Lebanese Public Transportation Issues

The local public transport system consists of bus routes, complemented with jitney operations, relatively successful in connecting most areas to the industrial and commercial centers of Beirut. During the early 1950's, 3,200 jitneys began to operate in Beirut as well as other major Lebanese towns. In 1965, the government replaced the streetcar system with a publicly owned bus network, operated only in Beirut; uncovered locations by the bus network were complemented by jitney operations that spread throughout the city and its suburbs (Bassil, 1993).

Five different public transport modes operate within the city of Beirut, all of them under a market situation closest to complete deregulation, often competing aggressively, and over a limited ridership market (Baaj, 2002). These modes are (i) the Railway and Public Transport Authority (RPTA), mostly operating within the Greater Beirut Area, and subsidized by the government; (ii) the private Lebanese Community Corporation (LCC) operating several bus routes throughout the GBA, most of which – as the company claims - are profitable; (iii) the minibus system, generally privately owned and operated by single owners, operating within the GBA, predominantly in its suburban areas (Zeinati, 2001); (iv) jitneys; and (v) taxis. Jitneys are mostly privately owned, and operated by single owners seeking random demand for transport, while taxis are mainly owned by enterprises or taxis companies, and usually pick up passengers based on phone call requests.

The public transport modes serve only about 29% of the daily trips made by approximately 1.5 million people residing in the Greater Beirut Area. This mode share is estimated to be subdivided as follows: 19% for jitneys and taxis, 2.5% by RPTA, and 7.5% by LCC and minibuses (Nakkash, 1999).

Lebanese Jitney Issues

Vehicle Fleet

The jitney fleet consists of 5-passenger vehicles, predominantly Mercedes cars that are more than twenty-five years old on average. Before the 1975 civil war, the government had the jitney operating licenses (in the form of red plate numbers) limited to 10,650 ones. During the war, however, many illegal jitneys started operating in a manner similar to other legal ones, which induced the government to intervene in legalizing- instead of terminating- extra operators that emerged during the war, through introducing 12,000 new operating licenses in the market for LL 6,000,000 each (Law 384, issued in November 1994). In addition to that, the government gave each of the original 10,650 drivers, as compensation for the added competition, an extra free operating license, for operating another vehicle as a jitney, renting it out, or reselling it to other operators. Accordingly, the government added 22,650 new

operating licenses during that period, which is more than double the original number of licenses (Baaj, 2002). The expansion of the jitney fleet did not correspond to an actual or anticipated demand on that sector. Currently, there are about 32,000 jitneys throughout Lebanon, about 20,000 to 25,000 of which are believed to operate within the Greater Beirut Area (Zeinati, 2001).

Operational Characteristics

The local jitney system is one of total private 'production' and 'provision' of services. Usually single individual owners operate their own vehicles with virtually no public or private regulations. They compete for customers with buses and (mainly) minibuses. They usually tend to be available in most commercial areas of the city for all day hours, especially during weekdays. Some jitneys also remain in circulation during night hours and weekends.

Following the increase in the number of jitney licenses in the mid 90's, jitney drivers started suffering from reduced ridership and destructive competition. Jitney unions repeatedly called upon the government to work on reducing the jitney fleet size by buying back licenses. In 2002, a law banning jitneys from operating on diesel engines included a provision stating that the government is permitted to buy back 10,000 jitney operating licenses from the market for the same price that was previously paid to the treasury (LL 6,000,000 per license). However, the law resulted in virtually no reduction in the jitney fleet size. One reason was that the price of an operating license at that time in the private (secondary) market was around LL 10,000,000. In 2003, a new decree permitted the government to buy back 7,500 jitney operating licenses, and set the price at LL 9,000,000 per license. The amendment again resulted in virtually no reduction in the jitney fleet size. The decree, like the previous one, apparently lacked a clear mechanism for implementing the buyback of licenses.

Market Arrangements

The local jitneys system is financially independent and unsubsidized, making the jitney fleet operate under a situation of complete deregulation. Fares although generally fixed, are somewhat negotiable. There are neither route restrictions, nor controls over areas being served. In addition, there are no restrictions on privately reselling or renting licenses out to other operators, making them widely available in secondary markets, with no control over market entry or exit.

Periodic vehicle inspection (locally known as *mécanique*) on all vehicles allows the government to collect inspection fees from all drivers; however, actual inspections do not take place. This is mainly attributed to the general poor conditions of the jitney fleet, since inspections could actually drive most of the jitneys out of business.

Approximately 70% of jitney drivers own both their cars and operating licenses; the remaining drivers usually own their cars, but rent the operating licenses for a monthly fee. Few drivers rent both cars and operating licenses for daily or monthly fees (Kaysi et al., 2001).
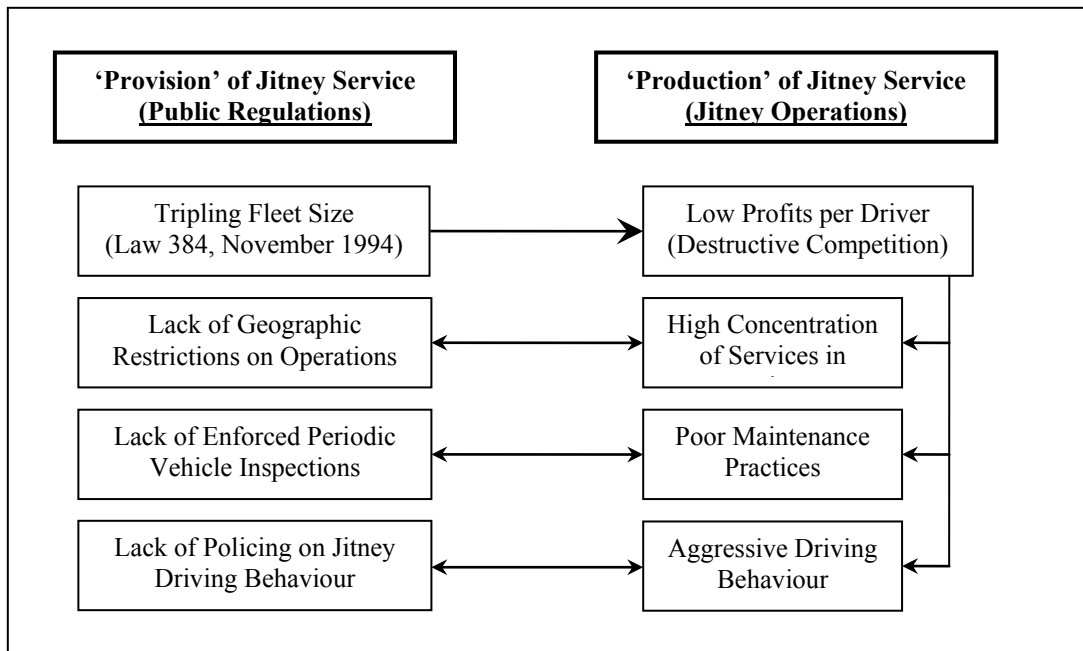
Organizational Characteristics

Although jitneys operate individually and with minimal public control, the majority of jitney drivers in Lebanon belong to two voluntary associations (unions). Each union consists of several jitney syndicates that are geographically distributed throughout the country. Drivers usually pay an annual fee of LL 20,000 for registration in a union. Unions impose no regulations over the operational aspects of the jitney system while they being active in relaying the concerns of their members to public officials. They have also been responsible for enrolling their members in the National Social Security Fund (NSSF), a pension and health insurance plan funded by the government, representing a strong incentive for owning an operating license. In 2003, however, the government stopped requesting such union approvals, and drivers became able to report immediately to the NSSF office, a step claimed to weaken tremendously the role of unions.

Assessment

Jitneys represent a smart and relatively affordable way of moving around, covering a wide area within the narrow roads of the Great Beirut, not obliged to fixed routes, hence resembling more the private vehicle in providing passengers with more freedom, choice, flexibility, and maneuverability in comparison with other forms of public transport. In spite of lack of governmental regulations, the jitney system is an already existing, well-established sector that provides services systematically. Nevertheless, the dramatic increase in the number of minibuses and jitneys during the 1990's did not correspond to a commensurate increase in market demand. This excessive number of jitneys along with the lack of restrictions on operation areas led to a high concentration of jitneys in Beirut, which contributes to the current congestion problems in the city. Moreover, while attempting to win over passengers, jitney drivers tend to exhibit inappropriate driving behavior, stopping randomly and suddenly.

Accordingly, jitney operations suffer from a situation of destructive competition. Operators are obliged to cut their costs (mainly bypassing maintenance and quality measures), and to aggressively solicit passengers to preserve an increasingly thinning profit margin.

Hence, the major "provision" problem of the tremendous increase in the jitney fleet size appears to be the main catalyst for many of the problems associated with both the 'production' and 'provision' of jitney services, as summarized in figure 2.

'Provision' of Jitney Service **(Public Regulations)**	**'Production' of Jitney Service** **(Jitney Operations)**
Tripling Fleet Size (Law 384, November 1994)	Low Profits per Driver (Destructive Competition)
Lack of Geographic Restrictions on Operations	High Concentration of Services in
Lack of Enforced Periodic Vehicle Inspections	Poor Maintenance Practices
Lack of Policing on Jitney Driving Behaviour	Aggressive Driving Behaviour

Figure 2- Provision and Production Problems of Jitney Services

JITNEY REFORMS IN LEBANON

Based on the general reforms suggested in the previous section for a typical jitney system, the following intervention strategies are proposed as reforms for the Lebanese jitney system. In general, while organizational and regulatory reforms seem to be harder to implement, the proposed reduction in the vehicle fleet size is argued to be more applicable.

Organizational and regulatory reforms

1. Encourage the formation of <u>route associations,</u> which would be offered operating privileges on routes, with the expectation that the associations themselves would regulate the number of operating jitneys. However, operators should respond to the formation of an organizational body that can coordinate the functions of route associations.

2. The jitney system may be developed further by establishing <u>differentiated services,</u> which may operate exclusively on certain heavy-demand routes (using larger vehicles) or offer premium services. Two difficulties may be associated with such a scenario, namely, the possible need for enforcement of exclusive operations and the high startup cost associated with larger vehicles needed for such services.

3. Introducing a <u>licensing mechanism</u> whereby, in addition to the red plate, municipalities would require jitneys to purchase a license in order to operate within

municipal boundaries. Buy out of multiple red plates in order to secure a municipal license may also be required, especially in areas with heavy ridership.
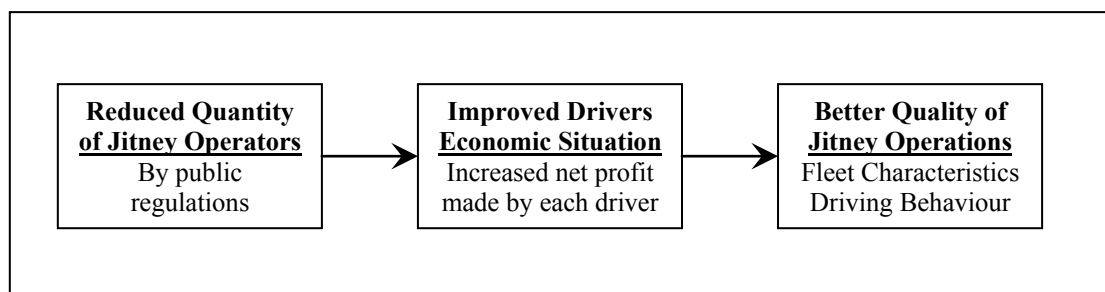
Reduction in Jitney Fleet Size

In case of a deregulated public transport system, the government usually intervenes in placing controls on quantity of operators in the market, avoiding reaching a situation of destructive competition among operators (Yagi, 1994). One example is the State of Rio de Janeiro Decree in 2000 that regulates and restricts van entry to the market, and enforces a set of rules concerning vehicle type, age, fitness, licensing for drivers and vehicles, and insurance (Golub et al., 2009). In Lebanon, although the government in theory is responsible for licensing jitney operations, the high number of operating licenses, and the possibility of obtaining them in secondary markets, create a situation of having no governmental control over entering/exiting the jitney system. Destructive competition, resulting from this excessive number of jitney operators can hence be identified as the major problem associated with the local jitney system.

Accordingly, it can be argued that the most efficient intervention is one that reduces the number of jitney operators in the market, which would have positive ripple effects on many aspects of jitney operations. Restoring a balanced free competition environment will increase returns for each driver. In turn, drivers would experience better financial returns on their operation, which can further encourage them to improve the quality of their services by investing in their vehicles and improving their driving behavior.

Reducing the number of jitneys will not only benefit remaining drivers, but will also benefit customers receiving improved levels of service, while the competition environment in general helps set fares at acceptable levels (Yagi, 1994). Furthermore, customers will receive improved levels of service essential for their satisfaction, the most critical aspects of quality being comfort, customer service, safety and security. This shall have a significant potential to retain existing users or attract new ones (Joewono & Kubota, 2007).

Figure 3 illustrates the correlations between the reduction in the fleet size, improving the economic situation of drivers, and improving the overall quality of their operations including levels of service, driving behaviors, and geographic distribution.

Figure 3- Profit vs. Quantity and Quality of Jitneys Operations

In this regard, a survey of the current jitney conditions in Lebanon was conducted in order to determine the optimal jitney fleet size as described in the next section. The survey explored driver profiles in terms of their driving license, financial status, and job satisfaction, in addition to vehicle conditions and operations.

SURVEY OF JITNEY OPERATIONS AND LICENSES

A survey was conducted in order to determine an optimal reduced number of jitney operators under which acceptable returns are ensured in the light of the current market demand. A profitability analysis quantified the correlation between the current number of jitneys and the average net profit gained by each driver.

The conducted random sample survey included questionnaires administered in structured interviews with 67 jitney drivers in Beirut during the months of January and February of 2005. Each questionnaire consisted of five sections. Following is a description of the questionnaire sections, their significance to the research, and their findings.

Profiling Drivers

This section aimed at finding out the proportion of operators for whom driving is the primary and only job versus operators who have other secondary jobs, or even consider jitney driving as a secondary one. Out of the 67 interviewed drivers, only 3 indicated that they have other jobs, and that they consider driving a jitney as a secondary job for the extra income and the valuable health insurance it provides.

Vehicle Conditions and Operations

This section inquired about the vehicle physical conditions, daily and weekly working hours, and the average trip duration of each passenger. About 90% of the vehicles in the sample were 21 years old or more. The average age of the older vehicles stands at about 25 years. The majority of the older vehicles are Mercedes 200's and 230's, while the newer vehicles are all Asian made.

Results also showed that drivers work for an average of 10 hours a day, and for an average of 6.2 days per week. Moreover, a passenger stays on average for 21.5 minutes onboard a jitney. This is about 10 minutes lower than the average trip duration in general within the Greater Beirut Area (TEAM International, 1994).

Driver Status and Job Satisfaction

This section included questions about the age of drivers, training, in addition to their job satisfaction, years of working as drivers, possibility of trading jobs, and NSSF status. Inquiring about the training and education of drivers, along with the possibility of trading jobs, is important in reaching recommendations relating to the type and method of compensating drivers after reducing the number of operators. The average age of the interviewed drivers in

the considered sample is 46 years. Figure 4 shows the age distribution for the considered sample of drivers.
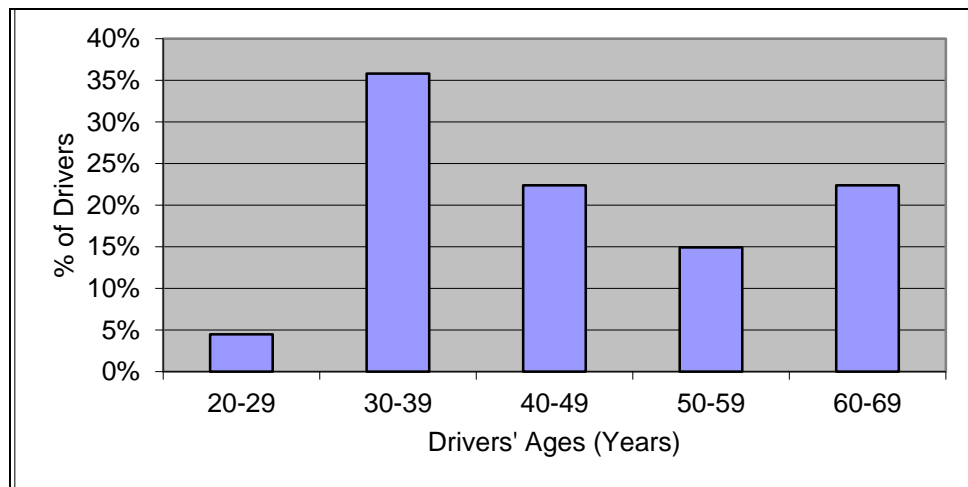
Figure 4- Drivers' Age Distribution

More than half of the interviewed drivers have operated jitneys for no more than 5 years (see figure 5). The majority claimed that jitney operations are anything but financially rewarding. About half of them expressed desires to shift to other jobs. Nevertheless, several drivers highlighted the advantage of job independence a jitney driver enjoys.
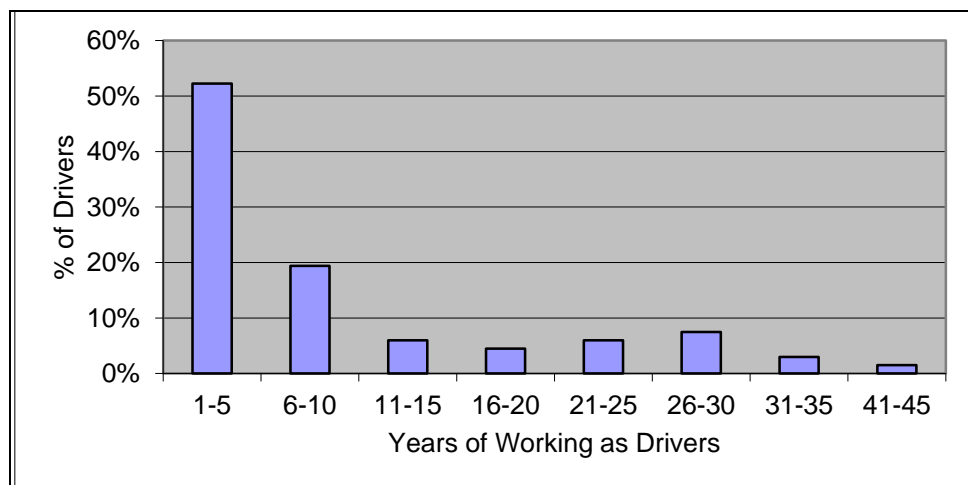
Figure 5- Distribution of Years of Working as Drivers

Finances

This part inquired about revenues and expenditures of drivers in order to estimate their net revenue. Revenues were derived from approximating the daily ridership level per driver, and the fare for each ride. Expenses include daily fuel consumption, monthly lubricant and maintenance costs, and annual vehicle registration costs, insurance and tire replacements. Table 1 presents a summary of these findings.

Table 1- Summary of Monthly Expenses and Revenues

Component (Average)	Daily (LL)	Monthly (LL)	Annual (LL)
Fuel Cost	34,000 →	935,000	
Lubricant Cost		40,000	
Maintenance Cost		95,000	
Mécanique Cost		9,000 ←	115,000
Insurance Cost		14,000 ←	169,000
Tire Cost		15,000 ←	180,000
License Rental (28%) [2]		32,000	
Total Monthly Costs		**1,140,000**	
Gross Monthly Revenue	56,000 →	**1,540,000**	
Net Monthly Revenue		**400,000**	

(1) Daily values are converted to monthly values through multiplying by 27.5.

(2) 28% of interviewed drivers rent their licenses. This is incorporated proportionally.

This component also includes questions asking drivers to give an estimate of both their current and desired daily net revenue. The average value of the estimated current net income stands at about LL 22,000 daily, which translates into LL 580,000 per month. The high discrepancy between this value, and the average monthly net revenue calculated in table 1 (LL 400,000) can be attributed to the fact that when drivers gave out their estimates, they only included fuel costs as expenses, without considering other maintenance and insurance expenses.

Status of Operating License

This section included questions about vehicles and operating license ownership status. If a driver rents the car and/or the operating license, the rental rate is incorporated in the revenue analysis indicated above (see table 1). If the driver owns the operating license, then there are further questions about the duration of ownership, price paid for license.

Results from the sample show that close to half of the interviewed drivers who own their operating licenses have bought them within the last 5 years (see figure 6). This is a strong indication of high rates of selling and purchasing operating licenses in secondary markets, especially since the government has last sold operating licenses in the mid 1990's. This means that while there are many taking over the job of jitney driving, there are as many people who are giving up this job. Prices for operating licenses ranged between LL 6,000,000 and LL 9,000,000.
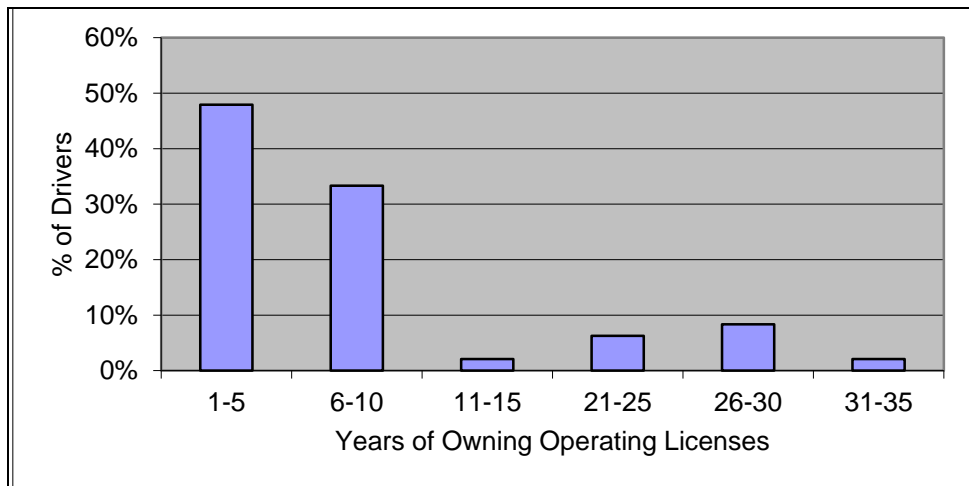
Figure 6- Distribution of Years of Owning Operating Licenses

FINANCIAL ANALYSIS AND RECOMMENDATIONS

The results from the survey help in establishing a relation between the jitney fleet size and the net profit made by each operator. This relation is then used to propose an optimal reduction in the jitney fleet size that improves the profitability of the remaining operators. The reduced fleet size is further crosschecked with current demand on jitneys to ensure their ability to serve this demand. Figure 7 graphically illustrates this procedure.
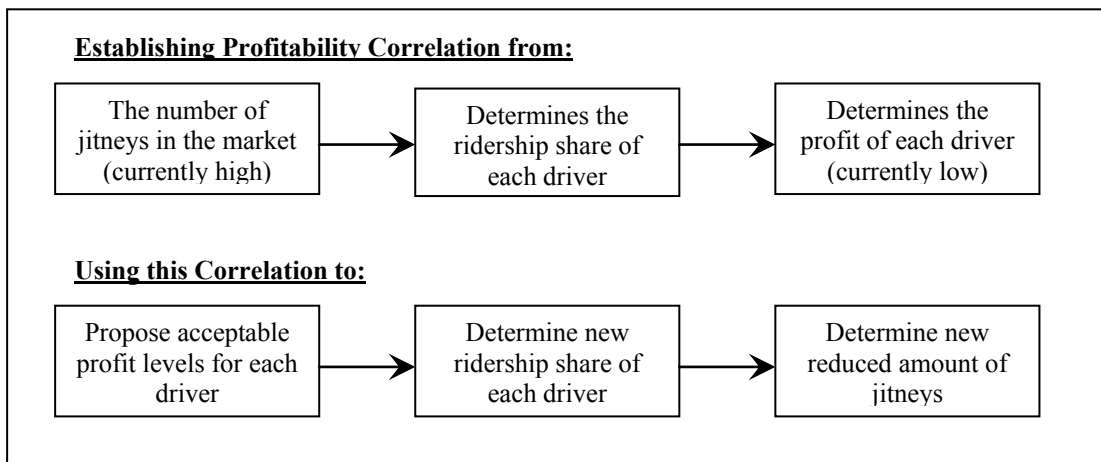

Figure 7- Proposing a Reduction in Jitney Fleet Size

Financial Analysis

Determining Appropriate Monthly Income Figures

A range of acceptable income figures, instead of a single value, was proposed, based on available socioeconomic statistics, as well as responses of interviewed drivers regarding their desired income. The proposed range is based on the following considerations:

1. While the calculated monthly average net revenue of LL 400,000 is above Lebanon's minimum wage of LL 300,000 in effect at the time the interviews were conducted (equivalent of $200), it can be argued that this figure was very low compared to domestic living expenses at that time.
2. The Central Administration for Statistics in Lebanon recommends that, for an average household of 5 persons, the required monthly income should stand at about LL 1,850,000.
3. The average desired income reported by drivers in their interview responses is LL 1,230,000, or roughly twice what drivers estimated their current income to be (LL 580,000).
4. Based on the fact that drivers doubled what they estimated to make when asked about their desired income, doubling what they actually make (LL 400,000 in the previous profitability calculation) yields a third estimate of an "acceptable" monthly wage. This figure stands at about LL 800,000.

Relationship between Net Monthly Revenues and Ridership Levels

The profitability calculation is used to develop a projection of net revenues, and obtain corresponding ridership levels that can generate such profits (assuming constant fuel, maintenance, insurance, and mécanique rates, as well as the same number of average daily working hours). The result is a mathematical representation of the relationship between monthly net revenues and ridership rates, represented by equation 1:

$$\text{Net Monthly Revenue} = (29{,}325 * \text{Daily Ridership Level}) - 1{,}140{,}000 \qquad (1)$$

The first term of the equation represents the average gross monthly revenues per jitney operator as a function of the daily ridership level. Survey results indicated that while most passengers (about 93%), pay a flat rate of LL1,000, an average of about 7% pay a double fare of LL2,000 for a longer trip. In addition, results from the sample showed that drivers work for 6.2 days a week on average, translating into 27.5 working days per month. Accordingly, the figure 29,325 is derived as follows: 27.5 * [(1,000 * 93%) + (2,000 * 7%)]. The second term of the equation represents total monthly expenses (see Table 1).

Relationship between Ridership Levels and Jitney Fleet Size

From current ridership levels, a linear relationship is established between different daily ridership levels and the jitney fleet size through projecting variations in the fleet size, and redistributing ridership rates according to such variations. This relation is presented in equation 2:

$$\text{Jitney Fleet Size} = 1{,}696{,}000 / \text{Daily Ridership Level per Jitney} \qquad (2)$$

The numerator represents the total jitney ridership level and is derived by multiplying the current total number of jitneys (32,000), by the average daily ridership level for the

considered sample of jitneys (53). It is important to note that two assumptions are being made here. First, it is assumed that all of the 32,000 jitneys are operating. Second, it is assumed that the estimated daily ridership level of 53 passengers (obtained from the jitney sample operating in Beirut) applies throughout the country. Hence although the initial work was intended for the city of Beirut, the final proposal will be in terms of the entire jitney fleet operating throughout the country.

Relationship between Jitney Fleet Size and Net Monthly Revenues

Finally, substituting equation 1 into equation 2, a direct relation between jitney fleet size and the generated net monthly revenue per jitney is established as presented in equation 3: Figure 10 graphically illustrates this relation.

$$\text{Jitney Fleet Size} = 49{,}735{,}200{,}000 / (\text{Net Monthly Revenue} + 1{,}140{,}750) \qquad (3)$$
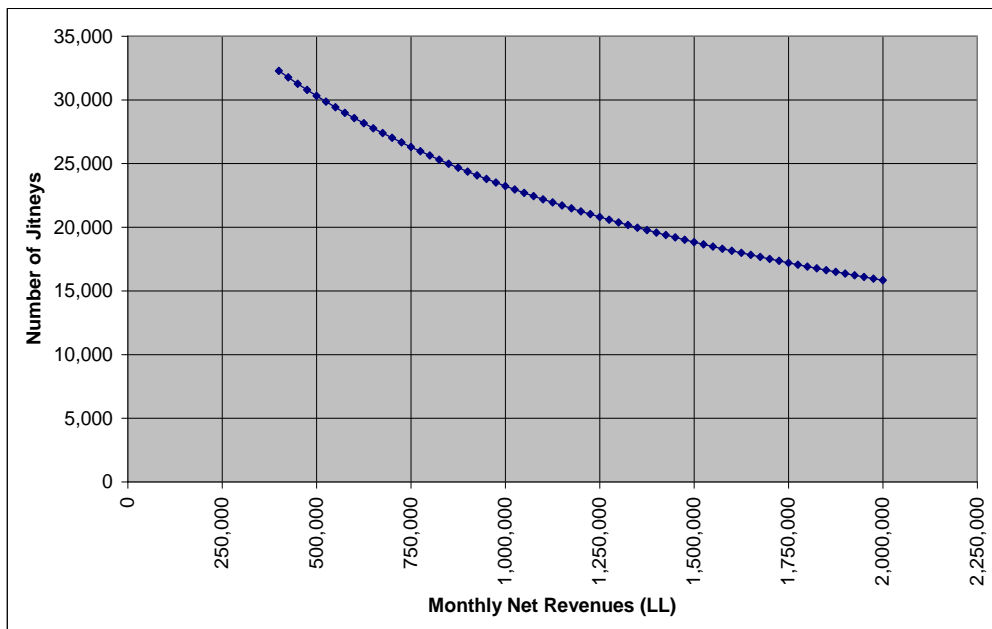
Figure 8- Jitney Fleet Sizes vs. Monthly Net Revenues

The possible values for the reduced jitney fleet size are based on the range of monthly income figures as proposed earlier. Table 2 summarizes these findings.

Table 2- Reduction in Jitney Fleet Size based on Proposed Net Revenues

Proposed Net Monthly Revenue	Source of Net Monthly Revenue Estimate	Daily Ridership Req. [per Equation #1]	Reduced Jitney Fleet Size [per Equation #3]	Reduction in Number of Jitneys (from 32,000)	% Reduction in Jitney Fleet Size
LL800,000	Twice the calculated current profit	66	25,600	6,400	20%
LL1,230,000	Desired monthly profit by drivers	81	21,000	11,000	34%
LL1,850,000	Central Administration for Statistics	102	16,650	15,350	48%

Proposed Reduction in Jitney Fleet Size vs. Available Demand on Jitneys

It is important to ensure that the reduced fleet size will be able to serve the market demand available for jitneys. Thus, a capacity analysis was conducted based on the average trip duration of each passenger, average working hours of each driver and a load factor (the percentage of time a jitney seat is occupied by a passenger) for each jitney vehicle. Results from the sample for instance show that drivers work on average for 10 hours a day, and that the average trip duration of a random passenger is 21.5 minutes. Based on a daily ridership rate of 53 passengers, the load factor accordingly is 47.5%. This means that each jitney seat is occupied by passengers for 47.5% of a driver's working day in order for the jitney to have a daily ridership rate of 53 passengers. Based on passenger trip durations and driver daily working hours, one can also obtain new loading factors of increased ridership rates corresponding to a reduced jitney fleet size. Loading factors are then used as indicators of the overall fleet capacity. Table 3 summarizes these findings.

Table 3- Loading Factors Corresponding to Reduced Jitney Fleet Size

Scenario	Monthly Net Revenue	Jitney Fleet Size	Daily Ridership per Jitney	Load Factor
Current	LL 400,000	32,000	53	47.5%
Scenario A	LL 800,000	25,600	66	58%
Scenario B	LL 1,230,000	21,000	81	72.5%
Scenario C	LL 1,850,000	16,650	102	91.5%

Recommendations

Looking at scenario C in table 3, loading factor calculations show that drivers will have all their seats occupied for close to 91.5% of their working day in order to serve this available

demand. Although theoretically possible, this loading factor is realistically a high one. One of the reasons behind the success of jitneys is their wide coverage area and operational flexibility. Requiring a high loading factor, however, can hinder such flexibility.

Scenario B, on the other hand, seems to be a more reasonable one. Drivers can serve as many as 81 passengers per day with a more realistic loading factor of 72.5%. At these rates, drivers can make as much as LL 1,200,000 of monthly net revenue, which is what they asked for on average during the interviewing process. In addition to that, scenario B proposes a jitney fleet size of 21,000, or 11,000 less than the current jitney fleet size. Jitney unions proposed this same reduction back in 2001. The government further supported this proposal through Law 341 of August 2001, where government is permitted to buy back 10,000 jitney operating licenses from the market for a relatively attractive price of LL 9,000,000 each.

Finally, it is recommended that the proposed reduction be phased in over a period of 2-3 years. In the medium term (3-5 years), the total jitney demand and ridership levels need to be monitored to evaluate the need for further reductions in the jitney fleet size. In the longer term (5-10 years), it is expected that the restructured bus system in the country shall be in a position to accommodate the increased demand for public transport services.

CONCLUSIONS

The fact that the jitney system already exists in Lebanon should be taken advantage of. The system is already private and, at a certain point, the government actually made profit out of it by selling operating licenses to drivers. Investing in this sector is also an opportunity because it is already well established and has a considerable share of the travel market, being the most utilized form of public transport. Based on analyzing the main implications associated with the local jitney system, this research proposed a reduction in the jitney fleet size while taking into consideration both the economic viability of operating jitneys, and the passenger demand expected to be served by the reduced fleet.
While the reduced fleet size can still serve demand available for jitneys, less jitneys at the same time translates into more revenue per remaining driver. This can further have a positive ripple effect on other aspects of jitney operations. Drivers would then be encouraged to improve the quality of their services by investing in their vehicles and improving their driving behaviour.
Projections correlating the jitney fleet size with the average net revenue per driver showed that drivers can double their revenue if the fleet size is reduced from 32,000 to about 25,5000 jitneys. Alternatively, a one-third reduction in the fleet size (from 32,000 to 21,000 jitneys), can actually triple revenues made by jitney drivers. Further analysis showed that even when considering this larger reduction (from 32,000 to 21,000 jitneys), the remaining fleet will still be able to support the available demand at a load factor of close to 72%.

Should this reduction in jitney fleet size take place, there is a major concern relating to drivers losing their jobs. Results from surveying the considered sample of drivers, however, demonstrated that close to half of the interviewed drivers who own their operating licenses

have bought them within the last 5 years. Moreover, new operators can only purchase operating licenses from other operators in secondary markets. This means that, while there are many taking over the job of jitney driving, there are as many people who are choosing to give it up.

Based on the research and analysis presented, the most significant recommendation can be for the government to play a leadership role in reducing the jitney fleet size. There is already a passed law permitting the government to do so. Additionally, the high selling activity of operating licenses in secondary markets implies that there are likely to be many drivers who are willing to sell their jitney licenses. The government accordingly needs to start controlling sales in informal markets and proposing to sellers the attractive compensation already stated by the law in return for their licenses. This compensation of LL 9,000,000 is could even be higher than operating license prices in secondary markets.

Finally, it is worth mentioning that any moderate reduction in the fleet size can considerably improve the profitability of remaining drivers, and hence operations of the system in general.

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