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(As of June 2010)

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US\$ 1.0 = NIS 3.85

NIS 1.0 = US\$ 0.26

ABBREVIATIONS

BICI	Bus Industry Cost Index
BRT	Bus Rapid Transit
CBD	Central Business District
CPI	Consumer Price Index
IPART	Independent Pricing and Regulatory Tribunal
Km	Kilometer
MOT	Ministry of Transport
NGO	Non-Government Organization
NIS	New Israeli Shekel
PA	Palestinian Authority
PTC	Public Transport Council
PTMIS	Public Transport Management Information System
TA	Technical Assistance
TOR	Terms of Reference
WB	World Bank
WBG	West Bank and Gaza
WI	Weighted Index
VAT	Value Added Tax

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Executive Summary

The Palestinian public transportation sector suffered from a prolonged period of neglect under the occupation. In addition the instability after the year 2000, which includes road closures, road blockades and numerous other measures by the occupation forces have severely affected the level of service for the public transport system in the West Bank and Gaza (WBG). The Palestinian public transit sector has demonstrated minor improvements in the past two years, due to capacity building measures at the Ministry of Transport (MOT) and an increase of number of public transit buses. However, the public transit level of service is poor on most routes. Thus the sector needs substantial attention and support by Palestinian Authority (PA).

The public transit system in the West Bank consists primarily of bus, shared-taxi, and regular call taxi modes. All public transit is privately operated. The bus companies have concession on specific routes, while shared-taxis are given permits on specific routes. The MOT sets the tariff and required performance criteria. The main subsidy by the government is the waiver of the customs on transit vehicles and nominal registration and permit fees for the bus mode.

Main Objectives of the Study

- Setting performance criteria and developing standard procedures for monitoring the performance of the public transit operations
- Develop a formula for calculating public transport (buses and shared taxis) tariff

General Methodology

A work plan was adopted after discussion with the MOT. Relevant studies, international experience, and MOT records were reviewed and summarized. Two meetings with stakeholders were held; the 1st meeting was to introduce them to background, objectives and methodology and to obtain their initial feedback and suggestions. The second stakeholders meeting provided them with preliminary results, conclusion, and recommendation of the study, and to obtained their feedback and comments. Questionnaires were distributed to bus and shared taxi operators to obtain input data for the tariff components.

Public transit performance criteria were outlined and grouped in categories in term of responsibilities along with monitoring methods. A tariff estimation model was developed using an outlined components and factors influencing tariff estimations. Finally, conclusion and recommendation were developed based on meetings with the client, stakeholders meetings, and various meetings with operators of public transit.

Performance Criteria and Monitoring Methodologies

The performance criteria suggested for the public transit in the WBG are grouped in three clusters namely: (a) basic or eligibility criteria for operation, which includes route permit and vehicle registration renewals, vehicles inspections and insurance; (b) Regulatory authority criteria for operation, these criteria are set by the MOT and includes, time of service, frequency or scheduling, tariff, meeting peak period demand, vehicle standards,

terminal and stops requirements, and accommodation of passengers with disabilities; (c) quality or level of service, which includes reliability or punctuality of schedule, safety records, vehicle comfort and cleanliness, terminals and stops facilities condition and cleanliness, fare options and collection methods, degree of overcrowding, and general image of the public transport system.

Monitoring is an essential component to a successful public transit operation, especially where minimum or no monitoring has prevailed for decades in the WBG. The following grouping are suggested for monitoring methods for public transit performance criteria in the WBG: (a) transit operators' annual report, (b) visits to public transit operators' offices, (c) random checks at terminals and stops, and (d) random bus or shared-taxi rides.

It is recommended to implement performance criteria gradually and in stages, especially since most performance criteria have mostly not been monitored for decades. The 1st set of basic or eligibility criteria is currently monitored and they should continue to be with improved management. The hours of operation and set approved schedules should be the minimum that operators' deliver in the 1st year with plans to improve the service in the next years.

Tariff Components and Formulation

There were no methods or formula used for estimating tariffs for the various routes and for each of the two public transit modes. This is the first attempt to establish procedures for calculating and estimating public transit tariff in the WBG. The following are components that influence tariff formulation, there are outlined below in five categories:

1. Cost of operation: This includes fuel costs and fuel consumption rates, vehicle depreciation costs, annual registrations, repairs, insurance, taxes, drivers salaries, and operation and administration costs
2. Demand (ridership): This includes number of round trip per day and weighted occupancy rates for each trip
3. Other sources of revenues such as field trips for schools and special event; in addition to on-vehicle advertisements (if applicable)
4. Profit Margin: All the public transit operators are private companies, thus a minimum profit margin must be expected.
5. Other factors affecting tariff estimation are mainly competition, affordability of passengers and uncertainties.

An interactive template was developed with sample routes calculations that incorporated the tariff component factors. The program is comprehensive and includes all possible tariff components; yet flexible and may be used for various modes, routes, and operational options. In addition tariff components may be added or omitted. The designed template sheet includes 40 columns, out of which 28 columns are input data, information or decision making parameters. The remaining 12 columns are calculated. The accuracy and usefulness of the tariff formulation is directly related to the accuracy of the input data.

Conclusion and Recommendations

The main conclusion is that public transit suffers from limited resources, closure of roads, and poor services; thus it requires substantial attention and support. This vital sector need regulations, monitoring and subsidies. An image change of the public transit system in the WBG is essential to make a substantial positive difference. Tariff must be tied to quality or level of service of the performance criteria. The monitoring of the performance criteria are essential, but need staff and funds for upgrading the MOT public transport section to be able to be up to this task. The calculation procedures for tariff estimation is highly dependent on the accuracy of input criteria, which must be periodical studied and updated. Finally, the renewal of route permits should be contingent to achieving minimum performance criteria.

Background

The World Bank Technical Assistance to the Palestinian Ministry of Transportation (MOT) and the public transport sector aims to alleviate the existing poor conditions of this vital sector. Previous studies to the Palestinian public transit sector by the World Bank have indentified that “transportation in the West Bank and Gaza faces extreme challenges, to the extent that mobility for people and goods is severely curtailed, with consequent impacts on the boarder functioning of society and the economy. The constraints on personal mobility within the West Bank and Gaza has greatly reduced the market for travel, and hence the business and viability of the transportation sector.”

The public transport system has been neglected during the prolonged period of occupation. The PA gained control of the administration of the public transit system in the second half of the nineties of last century, but it had very limited control on the routes of intercity travel. The PA helped in providing partial renewal of the bus fleet by facilitating low cost and suitable loans for 75 new DAF buses in 1995 – 1998. However, the intifada and unrest during the period from year 2000 has curtailed the public transit system. The closures of roads and numerous checkpoints have created many difficulties and challenges for this sector. Many transit destinations have been barred, especially public transit’s (buses) main hub of Jerusalem. Furthermore, many routes have been revised due to closures. In many cases the lengths or/and durations of routes has increased substantially, especially due to permanent and temporary checkpoints.

The public transit system in the West Bank consists primarily of bus and shared-taxi modes for intercity and peri-urban public transit; whereas the intra-urban public transit has in addition to the two mentioned modes, the regular call taxi mode. All public transit is privately operated. The bus companies have concession on specific routes, some of these concessions date back to the British mandate period in Palestine. Shared-taxis are given permits on specific routes. The MOT sets the tariff and required performance criteria. The main subsidy by the government is the waiver of the customs on transit vehicles.

There is no set methodology used for tariff estimation; the tariff increases in the past were based on requests by the bus and taxi operators to increase the tariff due to increases of the cost of living. The main criterion for requests to increase tariff was the increase of the price of diesel fuel. Furthermore, even though the MOT has requested several performance criteria from the public transit operators, rarely some criteria, such as bus transit service hours or schedules were monitored or implemented. Hence this study addresses these issues and provides guidelines for tariff formulation and at the same time linking tariff with implementation of key performance criteria. Finally, this study provides the mechanisms to monitor the public transit performance criteria.

The Goals of the Public Transport Sector in Palestine

To provide an efficient, convenient, and affordable public transit system that is accessible to all communities in the WBG with a population greater that 500 inhabitants. The

minimum service for the smallest communities is one service in the morning peak and a returning service for the afternoon peak. The service times and schedules should cover the needed demand, and should be conveyed to the public by various means. The service should be reliable and safe.

The Objectives of the Study

- Brief review of international experiences and best practice in the area of setting public transport tariff and monitoring the performance of the public transit services
- Setting performance criteria and developing standard procedures for monitoring the performance of the public transit operations
- Review and improve the existing manual for issuing licenses for new transport routes
- Develop a formula for calculating public transport (buses and shared taxis) tariff

General Methodology

The study has set terms of reference (TOR), which is mainly outline in the objectives of the study above. A work plan was adopted after discussion with the client (MOT). Relevant studies, international experience, and MOT records were reviewed and summarized. A preliminary meeting was conducted with stakeholders on March 28, 2010 at the MOT in Ramallah. There were 20 participants that included government official, members of the bus and shared taxi operating companies and the associations of bus and shared-taxi companies, in addition to some participants from Non-Government Organizations (NGO's,) notably, the association for persons with disabilities. In the stakeholder meeting, the objectives of the study were explained and feedback was obtained on the various aspects of the study (see minutes of the 1st stakeholders meeting in Annex 1).

Questionnaires were distributed to bus and shared-taxi operators, as well as to the both associations of companies of buses and shared-taxis. The questionnaire provided input data for the tariff formulation model (a copy of the both questionnaires in Arabic are provided in Annex 2). Furthermore, meetings with members of the bus companies association and the members of the shared-taxi association were held with the consultant of the study. The meetings were informative and provided insights to the complexities of the public transit system in the West Bank.

Public transit performance criteria were outlined and grouped in categories in term of responsibilities. Recommended monitoring methods with specific performance criteria were outline for usage in the WBG.

A tariff estimation model was developed using an outlined components and factors influencing tariff estimations. These components were discussed with the client and stakeholders.

Finally, the proposed performance criteria, monitoring methodologies, and tariff estimation model were discussed with the client and then with the stakeholders in a second meeting on April 20, 2010, where 18 participants attended the meeting (see Annex 1). The comments and remarks of the stakeholders and the client were refined and incorporated in the report, especially in the conclusion and recommendations of the study.

Review of Relevant Studies

1. Transport Sector Strategy Note (World Bank Report, October, 2007, Ref. 1)

The purpose of this study was to address the urgent constraints of the transport sector and support the Palestinian Authority efforts to revive the economy, improve mobility and reduce poverty. The study addresses the conditions and challenges of all modes of transport in the WBG. The main outcomes from the study were:

- The already limited existing road network is in poor condition
- The PA's capacity for the sector management is weak
- The PA has limited control and access to most of the road network used within the West Bank
- The institutional responsibility for the sector is unclear
- Public transport management and regulation is in disarray
- Road safety record is poor

The study concluded with recommendations for priority infrastructure investments, and outlined several potential projects; in addition to institutional reform capacity building

2. Passenger Transport Sector Development (World Bank Report, April, 2009, Ref. 2)

The study outlined the poor mobility conditions in the WBG, which are largely due to the road closures and checkpoints. The operators of the public transport sector are in a loss-making situation and cannot afford fleet renewal, so the quality deteriorates while some buses eventually stop running and some operators go out of business. The main strategy of development of the study includes:

- a. Consolidation among small operators to companies of sufficient size to achieve network, organizational, and operational efficiencies. The consolidation may be achieved via forming a new company or few companies or formation of union of companies and operation in full coordination in three regions (e.g., for North, Central, and South regions). The concept of area franchises is recommended.
- b. Fleet renewal is an urgent need; the options is to buy new buses or used buses from the Israeli market (usually life-expired buses with 12-years of service)
- c. Providing a bus leasing company and depot/maintenance facilities; in addition to a support services company for ticketing and passenger information for all regions.
- d. Adapting a regulatory framework to encompass the suggested changes, notably the area franchise concept and to enable the sector to develop.

There is resistance to the above strategy by most bus concession (Franchised) operators due to:

- a. They do not want to lose their historical identity as a company and permit rights
- b. Disagreements among assets estimation and share within conglomerated company
- c. Transparency required by the conglomerated companies and loss of sole control and power of current companies by owners/managers

3. *Public transport Gender Study (World Bank Report, July, 2009, Ref. 3)*

A survey of a sample of 385 men and women conducted in the North region of the West Bank in 2008 found that 97% of them use public transit. In addition, 73% of women depended on public transit, while only 61% of men depended on transit for most of their trips. Furthermore, 77% of the female responded (age 16 and above) indicated they do not have a drivers' license. Most respondents of the survey feel that public transit is not child-friendly, safe, or comfortable. The high percentage of people that use public transit are partially due to closures of roads and checkpoints that make driving at forced routes a difficult task with unpredictable consequences. The recommendation of the study stated integration of fares and providing transfer passes through coordination between lines to serve the vulnerable groups, especially women.

4. *Strategic Assessment on Energy Efficiency and Security for Public Transport in the West Bank (World Bank Report, October, 2009, Ref. 4)*

The objective of the study was to explore the options for the use of alternative fuels in the bus industry in the WBG, and carrying out initial examination of potential benefits and practicality. The study investigated the various alternative fuels used for public transit (particularly buses) worldwide in terms of cost-effectiveness and environmental assessment, and particularly addressed the available fuel alternatives in the WBG. The study excluded the practical use of fuel cell engines, hybrid buses (mainly using electric and diesel fuels), ethanol, and water-diesel in the WBG in the near future. Compressed natural gas is not currently present, but could be an option in the near future since it was discovered off the shores of Gaza. The only fuels available are diesel and Liquefied Petroleum Gas (LPG), but the latter is banned for safety reasons on behalf of Israeli-PA agreement, even though it is used in limited cases in some cars in the WBG (but not regulated).

The main recommendation is the need for fleet renewal for public transit buses in order to improve fuel efficiency and reduce pollution emissions. Alternative fuels are not practical in the near future, but there is a need for regulatory framework for LPG vehicles. Also, there is a need to improve maintenance process, especially for public transit.

International Experience

In many European countries the tariff levels and adjustments are deeply political, and there is very little correlation between transport cost and tariffs. There are three significant factors that contribute to this relationship (Ref. 5):

- a. Most European (and North American and Australian) passenger transport systems receive moderate to high levels of subsidies. There is a serious disconnect between the revenues (and hence the tariffs) and the cost base. The level of subsidy is quite political, and the tariff setting principles are tied in to the prevailing mood on subsidies.
- b. Most systems have integration of ticketing across modes, and have time-based ticketing (weekly, monthly). This leads to a serious disconnect between the published price of the individual journey and the actual travel per trip made by the user. In many European cities the level of single-trip payments is below 20%, and even then in many cases these charge the same price for a single- or multi-leg trip.
- c. In many countries, there has been a significant level of contracting out of urban bus services. Almost all of these are 'gross cost' contracts - i.e. the operator is paid for the production of the services, while all the revenue goes to the transport authority. The focus is on the formulae for calculating the service production payment to the operator, and how to adjust this over time, but it is decoupled from the tariff setting.

The following are some case studies related to public transit tariff factors and formulation experiences:

1. Sri Lanka

A study by Amal Kumarage titled "Criterion for a fares policy and fares index for bus transport in Sri Lanka" in the International Journal of Regulation and Governance in 2002 (Ref. 6) states that the then-proposed fare policy in Sri Lanka (which has been in force as the Bus Fares Policy since 2002 with annual reviews) was based on cost, quality of service and subsidy payment. Moreover, the following factors were considered:

- Passengers' profile and affordability
- Efficiency and cost of bus operation
- Fare structure and anomalies
- External benefits and operator subsidy
- Mechanism for fare revisions and elimination of anomalies

The paper provided a good review and analysis of the cost component and constructing the cost index; however, there were mostly subjectivity in the other four components outlined above. The operation cost components used were the following:

- Fuel cost (diesel)
- Crew cost
- Service and lubricants
- Tires and tubes
- Air-conditioner
- Maintenance + overhaul
- Repairs

- Daily overhead
- Monthly overhead
- Annual overhead
- Depreciation of bus
- Financing of bus
- Provision for risk

The cost index is thus a weighted average of all the cost inputs, or a composite index of all components. Furthermore, the fuel cost was further analyzed to consider type of route and speed. Road conditions and mountainous destinations would be more costly than level routes. The study also tried to associate fares with service quality, particular load factor or overcrowding. The subsidy was linked to affordability and usefulness, especially reducing congestions at city streets. The paper concluded that lack of fare policy resulted in deterioration of quality of service and stressed the benefits for fare structuring, especially maintaining service quality and providing transparency that would reduce unnecessary bargaining and canvassing among public transit operators with politicians to increase the fares.

2. *New South Wales (Sydney), Australia*

A recent study by the Independent Pricing and Regulatory Tribunal (IPART), New South Wales, Australia titled "Review of fares for metropolitan and outer metropolitan bus services from January 2010" (Ref. 7) determines the fares to be applied for the metropolitan and suburban bus services for Sydney and its surrounding area. The review provides the framework for fares increases over a 4-year period. As in the Sri Lanka case, fares are revised annually to avoid major occasional increases for users and uncertainty or cash-flow problems for operators. The IPART study outlines the use of Bus Industry Cost Index (BICI) to calculate the change of cost of operations for a one year period. The BICI includes a basket of cost items including bus capital cost, wages, salaries, fuel, insurance, maintenance, repairs, and other costs. Each item in the basket has a weight based on the proportion of an average operator's total costs that it represents. Each year, the individual cost items are inflated to reflect changes in the cost of the item per year. Each cost item is inflated by a relevant data series or index. A simplified example of cost index calculation is provided in table 1 below.

Table 1: A Simplified Example of a Cost index Calculations

Cost Item	Weighting (%)	Change	Contribution to index
Labour costs	60	8.3%	5%
Bus purchase and repairs	30	5.0%	2%
Fuel costs	10	30.0%	3%
Overall change in costs	100		10%

Note: Totals may not add due to rounding.

Source: "Review of Fares for Rural and Regional Buses from January 2010," Tribunal Independent Pricing and Regulatory Tribunal, New South Wales, Australia, December 2009

This method is appropriate for an authority that contract private public transit operators and are paid for set services (namely, using designated buses on set schedules on weekday and weekend for specific routes for the entire year). Thus the increase of transportation operation cost could be directly reflected on the fares. In the case of New South Wales, Australia, the set operation for routes, stops and schedule is contracted to the operators and fares are substantially subsidies, especially for marginalized groups and special fares that are substantially less than the maximum one-way fare.

3. *Singapore*

A paper titled “Instituting Fare Regulation” by Looi Teik Soon and Tan Kim Hong (both of the Singapore Public Transport Council) (Ref. 8) describes the fare regulation applied to the two dominant public transport operators of Singapore’s bus and Metro systems. After several years of an annual Fares Cap based on:

‘Price Index =Consumer Price Index + X’ (where X could be negative)

A revised approach has been developed. This recognizes that the cost inputs for the passenger transport sector do not all correspond well to the general Consumer Price Index (CPI). The formula has been revised in two parts. The Annual fares increase calculation is to split the costs into two components:

“Price Index = 0.5(Δ CPI) +0.5(Δ WI)”

Where WI is a Weighted Index of transport specific costs. This recognizes that cost inputs such as salaries, administration and general overheads tend to adjust in line with the prevailing consumer price index, whereas transport specific items such as rolling stock, spare parts and fuel respond to global prices and currency fluctuations.

When circumstances require, the Public Transport Council (PTC) has two further instruments available to it to modify fare increases. The first allows the PTC to track the Operators’ Return on Total Assets (ROTA) to determine whether the profit levels become excessive. If so, a downward adjustment can be applied. In 2007-8, it was calculated that Operator gain was 3% per annum, and Government decided to recover half of this, leaving the Operator to enjoy the other half. In part, government wishes to ensure that the operator continues to be incentivized to seek efficiencies. The Fares Cap was adjusted to:

“Fares Cap = 0.5(Δ CPI) +0.5(Δ WI) -1.5%”

The second mechanism for PTC relates to tracking Fares Affordability for the population, and in specific circumstances, PTC can seek a fare freeze or even a reduction in fares. However, it should be noted that this is consistent with broader mechanisms in the Singaporean economy to temporarily contain wage rates and employer costs in case of economic downturn – this might not be applicable in Palestine.

Finally, since 1992, Operators in Singapore are required to establish and maintain a Fuel Equalization Fund, which avoid the need for erratic fluctuations in tariffs or pressure by Operator for sudden tariff increases in response to global price changes in oil.

5. *Bogota, Columbia*

The document “Concession Contract for Urban Mass Public Transport Services” forms part of the 2002 concessions for the second tranche of the Transmillenio, the Bus Rapid Transit (BRT) system of Bogota (Ref. 9), which has the highest capacity of a BRT in the world. The basic organization is a city-owned management entity (Transmillenio) which developed the infrastructure and establishes contracts with operator of the BRT Trunk Routes, of the BRT Feeder Routes, and of support services such as the Revenue Collection system. The system is required to be self-sustaining financially and to require zero subsidies for any of its cost of operation, fleet, or system management.

A Technical Tariff is derived and subsequently revised according to a formula. This is not necessarily the same as the User Tariff at a given point in time. The Technical Tariff takes into account the system costs (fleet, operations, support), reasonable profit, tickets sold and kilometers operated, so that the system remains in financial balance. As in Singapore, there is the equivalent of an equalization fund to smooth variations in input costs (especially fuel) so that there is reasonable stability in the User Tariff charged to the customer, and to allow a modest deferral of the User Tariff adjustment. However, this cannot exceed the reserves of the Contingencies Fund, and so User Tariff increases cannot be postponed indefinitely.

Tariff is adjusted when a new operator enters the system. This was very relevant at the time of the contracts (2002) because Phase 1 was already in place with 4 Trunk route operators and 5 feeder route consortia, and the new contracts were being applied to the Phase 2 operators and services. Such a mechanism may, or may not, be applicable to Palestine, depending on whether the operators all remain independent or whether they consolidate, at least at the operational and revenue levels. What is likely to be relevant in any case is the approach to: (i) weighting among trunk, feeder and revenue collection components; (ii) weighting among cost components and the detailed elements of the cost components for the trunk routes and for the feeder routes (note that station cleaning and security costs are included in the feeder element of the tariff formulation).

6. *Syria*

The Bus Companies at Damascus, Aleppo, Homs and Lataqiya are owned by Syrian Ministry of Transport (SMOT). They were established under the Investment Law and hence are treated as an economic institution rather than as a services company. This requires them to account formally for expenditure and revenue. All of the companies are established on the basis of similar charters, and while each does its own planning and organization, they are fundamentally similar companies. The companies state that they plan and manage their services themselves. There is a working relationship with the Transport Committees of the Governorates.

Tariffs are set at a ‘social level’ to cover about 30% of the operating costs. It would need to be higher again to recover vehicle investment costs and to make a modest return in investments. The bus companies receive financial support to cover their deficits. SMOT has an annual budget from the Central Government, which includes allocations for the bus companies. Ministry of Finance deducts an amount from this allocation to cover the interest on the new buses, but not an amount for the capital. It was not clear whether the allocation has been increased to include the amount for the interest, or whether it represents a reduction in real terms in the available financial support. The companies state that the allocation is not always sufficient, and that debts accumulate.

The bus companies are operating a mix of new and old fleets. New buses were received in 2008 and distributed to the 4 bus companies. The old buses are in the ownership of the company. The new buses are not paid for yet, so they remain in the name of Ministry of Finance. Old buses vary in age from 17 to 33 years (Ref 10).

Most of the international experiences have subsidies for public transport operation, unlike the Palestinian case. Also the international experiences discussed above have not touched much on the demand component. This is mostly due to operators having an annual contract to deliver a service regardless of demand or ridership level, or the demand is substantial as in the Bogota and Singapore examples that the service just needs to meet the demand. The demand component for tariff estimation in the Palestinian case is very significant, especially when there is higher number of vehicles (particularly shared-taxis) than what is needed. Furthermore, a main obstacle for setting a fair tariff to the operators and public is the level of service provided. Hence, setting criteria and implementing it via appropriate monitoring is a prerequisite to defining a tariff formulation.

Ministry of Transport Records

The MOT records (Ref. 11) are not organized or updated. It is a difficult task to retrieve data for public transit operations. Some of the data could not be found in electronic format. There is an urgent need to organize the databases and procedures for data storage and retrieval options. A component of this study is to organize the system of data input and make databases more user-friendly. For details please refer to Annex 3: Draft Terms of Reference (ToR) for Development, Supply, and Implementation of Public Transport Management Information System (PTMIS).

In the past two years there have been some improvements to the public transit system, especially the bus mode. This is due to somewhat more stable conditions in the West Bank and due to some capacity building efforts taken in the past two year to improve this sector. The number of registered buses has increased from 594 buses in 2008 to 703 buses in 2010. Most of the increase is in the small size buses. Unfortunately, some of these vehicles are smaller than to be defined as a bus, especially a vehicle with as low as 10 passengers’ seats capacity. A definition of bus by MOT states it is a vehicle used for public transit that has a passengers’ seating capacity greater than 8. A basic definition for a bus is a public transport vehicle that is high enough for passengers to walk standing

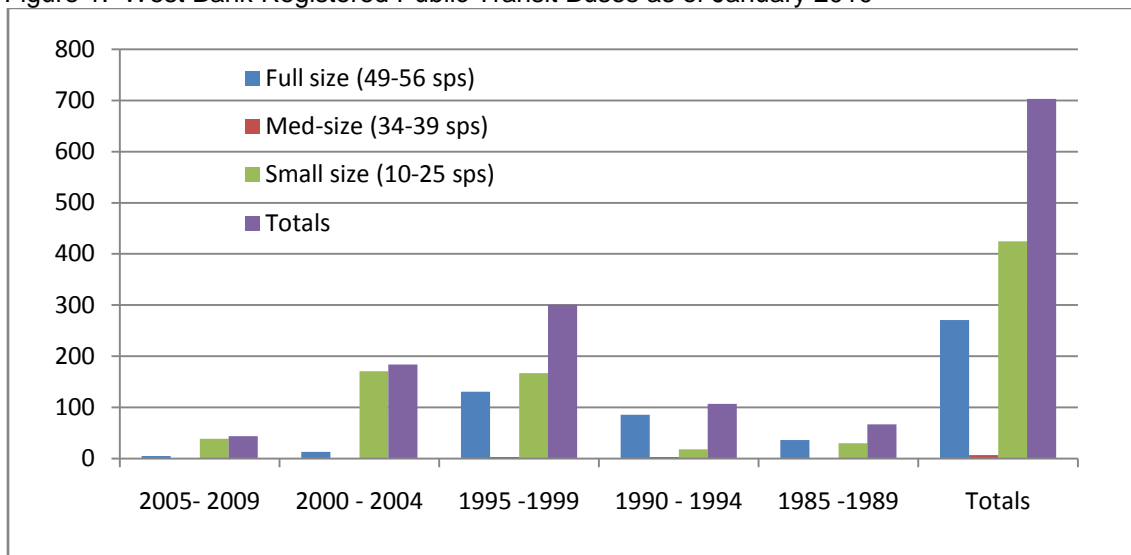
up, and it is usually seats more than 16 passengers. However, it must be noted that only less than ten registered buses have a seating capacity of less than 15 passengers. The great majority of small buses range in capacity from 16 to 25 seats. Table 2 provides the distribution of registered public transit buses in the West Bank as of January 2010 by model and seating capacity. Figure 1 illustrates the values of table 2 graphically.

Table 2: West Bank Registered Public Transit Buses as of January 2010

Model	Full size (49-56 seats)	Med-size (34-39 seats)	Small size (10-25 seats)	Totals
2005- 2009	5	0	39	44
2000 - 2004	13	0	171	184
1995 -1999	131	3	167	301
1990 - 1994	86	3	18	107
1985 -1989	36	1	30	67
Totals	271	7	425	703

Source: Ministry of Transportation Records, 2010

Figure 1: West Bank Registered Public Transit Buses as of January 2010



Source: Ministry of Transportation Records, January 2010

Table 3 shows the number of regular call taxis, share inter-city taxis and shared intra-city taxis in various governorates in the West Bank as of April 2010. The number of registered taxis has increased by several folds, since the establishment of the PA in the mid nineties of last century.

The number of regular (yellow) taxis is reasonable when compared as taxi per capita for various cities worldwide. However, it is clear that the number of shared taxis is very high, particularly it is very limited or non-existent in many countries in the world. Share taxis compete directly with the bus transit mode, and if bus transport mode operates

appropriately, especially providing a set reliable schedule for a suitable service period then it could be more suitable for customers in most cases. Furthermore, on most routes bus public transport would be more reasonable to operate, especially for high demand routes and at peak periods. In such cases even mini-buses are not appropriate and full size buses are required; at very high demand articulated buses become more suitable. Currently most high demand routes are served by shared-taxis.

Table 3: Number of Registered taxis per type and governorate in the West Bank

Governorate (West Bank)	Call-Taxi (Yellow)	Shared Taxi, Inter-city (orange)	Shared Taxi, intra-city (Yellow and Black)	Total
Ramallah	662	1108	189	1959
Jenin	386	553	20	959
Nablus	914	556	643	2113
Bethlehem	309	524	140	973
Hebron	859	1056	213	2128
Tulkarem	316	382	124	822
Jericho	115	72	25	212
Qalqeelia	229	177	0	406
Tubas	51	77	0	128
Salfeet	25	122	3	150
Total	3866	4627	1357	9850

Source: Department of Transportation Records, April 2010

Performance Criteria of Public Transport Sector

A basic economic concept correlates the quality of a product to its price or what people are willing to pay for a product or a service. Thus public transit performance criteria should be associated with tariff. However, public transit has some captive demand ridership, which have no choice but to use the available public transit; hence public transport operators in most situations have a monopoly on operational services, and thus should require additional regulations and monitoring.

Quality standards for public transit are limits and values expected of the various performance criteria. The main reasons for setting quality standards by transit authorities are:

- a) The Transport Authority acts in the social interest to ensure that the passenger transport meets the citizen needs of mobility, safety and comfort
- b) The Transport Authority is the Client for services, and defines the quality it expects for the rights to operate that it confers, or/and the funding it provides

- c) Poor public transit negatively influence the macro-economics of a city or metropolitan area; hence one of the criteria of many businesses to open offices in a city or relocate out of such city is the level of service of the public transit. Also attraction of tourist to some extent is influenced by the existence of high performance public transit service.

The quality of the transport services impacts directly on the quality of life of most citizens. At the same time, the quality of service along with the fare would mainly influence the demand, especially for citizens with better incomes; where public transit can attract demand for travel from car owners or those who can afford to buy a car.

In general, the performance criteria for public transport are universal, being equally applicable in developed and developing countries, and in countries in transition. It is a common misconception that locations where the public transport has deteriorated cannot use the same criteria as where it works well. In fact, only the values of level of service of those criteria vary; in addition to reasonable target values for a program of improvement (Ref 12).

The following is a list of performance criteria used for public transit in general:

1. Time of service: hours of operations, especially at night and early morning for weekdays, weekends and holidays.
2. Frequency or headway for peak, off-peak and night service. The headways should be translated to a schedule of departures from the end terminals as well as stops (or some intermediate stops). The schedule should be published to users in numerous forms (on buses, at terminals and bus stops, via a website, and pamphlets). Any change of schedule should be announced before a sufficient time by all media of distribution of the schedule. Schedules should be for a year, but not less than three months. The schedule should include holidays and special occasions, such as the month of Ramadan.
3. Reliability or punctuality of schedule: unreliable schedule expedite the loss of patronage to other modes of transit or to private autos. No trip should be allowed to depart before the scheduled time, including intermediate stops. The limit of accepted late time is usually between 3-8 minutes for bus mode and substantially less for rail modes. Punctuality is basically departing on time, or within given tolerance limits; and the reliability is the percentage of trips that are within such limits. Customers may tolerate an extra 10 minutes of waiting time if it happens occasionally (and especially if the circumstance is explained to them or is obvious); whereas the same delay happening every day would be unacceptable.
4. Duration of in-vehicle journey, which is mainly a function of distance and average speed at various periods, especially considering traffic congestion
5. Waiting time: It is mainly a function of headway and reliability of schedule
6. Walking time: It is a function of distance to bus stops or route with available public transit, and walking speed of riders. Thus location of bus stops could help reduce walking distance. A walking distance of 200 – 300 meters (or a walking time of about 5 minutes) is assumed reasonable walking distance for transit riders.

7. Transfer time (for trip with no direct public transit route): This is a function of coordination of the schedules' of various routes and their reliability.
8. Fare and fare adherence: There could be numerous fare options and incentives
9. Safety: accident records for frequency and severity of accidents and drivers' traffic violation records.
10. Line capacity at peak periods (spaces/hr or seats/hr): The peak periods demand should be met by the line capacity and hence dictates the number of transit vehicles needed (this is a function of vehicles size and round trip duration).
11. Comfort: vehicle's condition, model, type, and cleanliness, noise in the vehicle, heating/air conditioning, etc.
12. Terminals and stops' facilities, condition, and cleanliness (shelters, signing, restroom, water fountains, etc.)
13. Customers' support services (availability of information prior to the trip and during the trip)
14. Degree of overcrowding (within vehicles and within terminals and at bus stops)
15. Accommodations for passengers with special needs, especially the physically challenged persons (most notable wheel-chaired and blind persons)
16. Compliance to regulations: registration, vehicle inspection, permit renewal, and insurance
17. Other: General image, drivers' courteousness, etc.

The performance criteria for the public transit in the WBG may be grouped in the following categories mainly with respect to the responsibility of each criterion:

- I. **Basic or eligibility criteria** for operation, this includes:
 1. Route permit renewal
 2. Vehicles' registration and inspections
 3. Vehicles' insurance
 4. Valid and appropriate driver licenses for drivers

- II. **Regulatory authority criteria for operation**, these criteria are set by the Ministry of Transport, it includes:
 1. Time of service or hours of operations
 2. Frequency or headway for peak, off-peak and night service
 3. Tariff (fare)
 4. Line capacity meeting demand for peak periods
 5. Vehicle model, condition, and minimum functions required
 6. Terminals and stops' basic required facilities,
 7. Customers' support services (minimum requirement)
 8. Accommodation for passengers with special needs

- III. **Adherence and quality or level of service** is the responsibility of the operators. These criteria provide competition among various public transits modes and set

the criteria for transport mode diversion, especially between auto and public transit. These criteria include the following:

1. Compliance and adherence to 1st two categories of performance criteria namely basic or eligibility criteria and the planned criteria
2. Reliability or punctuality of Schedule: This is usually the most significant criteria in most cities in Europe and North America, since there are rarely problems with other set criteria.
3. Scheduling design criteria (also include frequency/headway and transit units needed to meet demand at peak periods, which are outlined in the Planned Criteria category):
 - a. Duration of in-vehicle journey
 - b. Waiting time
 - c. Walking time
 - d. Transfer time
4. Safety record
5. Vehicle comfort, cleanliness, noise in the vehicle, heating/air conditioning
6. Terminals and stops' facilities, condition, and cleanliness
7. Fare options and collection methods
8. Customers' support services (ridership attractiveness services)
9. Degree of overcrowding
10. adherence to "no smoking" in the transit vehicles
11. Other: General image, drivers' courteousness, etc.

There could be additional spinoff performance criteria and also various methods to categorize the performance criteria such as technical, service quality, subjective indicators, etc. In addition, the perception of the users of the service is of paramount importance, even if it is not totally correct. This perception highly influences ridership and the overall image of public transit in general or for each specific mode in particular. Finally it is not important to only recognize and categorize the performance criteria, but it is essential to monitor the performance criteria effectively and efficiently.

Monitoring of Performance of Public Transport

Monitoring is an essential component to a successful public transit operation, especially where minimum or no monitoring has prevailed for decades such as in our case study of the WBG. In some well developed public transit systems in the world, the main and may be the only source of monitoring is the operators' evaluation and annual reports. It is recommend this should be a main source of monitoring information for the public transit in the WBG, but certainly it should be complemented by other monitoring methods. The following are five main grouping suggested for monitoring methods for public transit performance criteria in the WBG:

- I. Transit operators annual report: the report should include the following information and documents:

- a. Route permit renewal
- b. List of vehicles' types, model and records for registration, inspections and insurance. In addition to the kilometers traveled readings for each vehicle's inspection
- c. List of drivers, documents of valid drivers' licenses, duration of work, buses used by each driver, traffic violation for each driver and finally the salary for each driver including overtime payments.
- d. A report on the adherence to set schedules and times of operation throughout the year
- e. Passengers' information system (webpage, brochures, signs, boards within buses and at stops and terminals, etc.)
- f. Financial report: Including all costs and revenues (including revenues for special events and advertisements on vehicles and at terminals and stops, if applicable)

II. Office visits (field visits to operators)

The purpose of the office visits is mainly to validate the information on the annual report and verify the management aspects. Some of the documents that may be reviewed are the vehicles' logs, drivers' log, safety records, scheduling and operations, customers' services and financial records.

III. Random checks at terminals

- a. Adherence to schedule
- b. Meeting demand at peak periods (some routes have passengers waiting for long time at peak periods without availability of sufficient transit vehicles)
- c. Signs for route number and destinations (and intermediate stops)
- d. Posted schedules and fares at a suitable location
- e. Condition and cleanliness of terminal
- f. Vehicles' conditions

IV. Random checks at stops

- a. Adherence to schedule
- b. Signs for route numbers and destinations
- c. Shelter's condition

V. Random bus rides

- a. Check adherence to schedule per stop
- b. Bus condition and cleanliness
- c. Signs: routes and destination (variable), schedule, and fares
- d. Driving quality
- e. Driver's attitude and curiousness
- f. Crowdedness

The random checks to terminals, stops and bus rides should be structured and planned by the MOT; however, they should be random for the operators, who should not know the dates of such visits.

The most significant performance criterion for bus public transit is the adherence to the agreed upon and announced schedule. This very essential performance criterion has not been seriously requested from the transit authority nor had it been implemented by the operators for decades in the WBG. For share taxis this criterion (set schedule) is not required, since it is expected that shared taxis must only travel from the end terminal when the vehicle is full. If a vehicle leaves the end terminal not full or does not load from the end terminals this would cause unfair competition to the bus mode. Some of the performance criteria of significance to the shared taxi modes are: route adherence, vehicle condition, safety records, and adherence to “no smoking” in the vehicles.

The monitoring of the performance criteria by the MOT for public transit operators should be kept in records and should be used for annual evaluation for renewal of public transit route permits. Violating operators or public transit routes operating below the set standards should be requested to overcome the shortcomings, if the situation continues they should be warned, also operators with repeated warnings may be fined or/and the route permit may be temporary or permanently revoked.

It is recommended to implement performance criteria gradually and in stages, especially since most performance criteria have mostly not been monitored for decades. The 1st set of basic or eligibility criteria is currently monitored and they should continue to be with improved management. The hours of operation and set approved schedules should be the minimum that operators could deliver in the 1st year with plans to improve the service in the next years. Thus other performance criteria, such as safety records, reliability, bus conditions need to start being monitored and to document the performance criteria in a systematic manner in order to have reference for next year’s evaluations.

Transit System Performance Calculation Equations

The following are calculation procedures for key performance criteria, especially scheduling and minimum fleet size (and seating capacity or spaces per vehicle) needed to meet peak period demand. Thus, periodic demand surveys and monitoring of trip durations at various periods are needed to determine the headway and vehicle fleet size required to meet peak period demand. Thus the following equations may provide reference to MOT personnel, as well as, bus company operators to determine key performance criteria, especially the number of buses required to meet peak period demand (most equations obtained from Vuchic, 1981, Ref. 13):

1. Frequency/Headway

Frequency (f): number of Transit Units (TU’s) per hour (TU/hr)

Headway (h): time period between the departures of successive TU’s from the same station (or stop). The units may be in hours, minutes or seconds as in equation below respectively (hr/TU, min/TU, sec/TU).

$$f = \frac{1}{h} = \frac{60}{h} = \frac{3600}{h}$$

2. Transit Unit Capacity(C_{TU}): Number of spaces per transit unit

$$C_{TU} = c_v \cdot n = c_v \cdot n_{\max}$$

where:

c_v : sps/veh

n : veh/TU

n_{\max} : maximum veh/TU

C_{TU} : number or maximum number of sps/TU respectively

3. Vehicle Line Capacity (c): maximum number of transit units that can be transported past a fixed point (a station or a stop) during a unit time (usually per hour) under set conditions.

$$c = f_{\max} \cdot n_{\max}$$

Where:

c = veh/hr

f_{\max} = maximum frequency (TU/hr). Maximum frequency is also minimum headway, which is the minimum of line (way) headway (h_w) or station headway (h_s). Line headway is a function of speed, acceleration, deceleration, and transit units' performance profiles that meets safety requirements. However, station headway is a function of minimum boarding and alighting time of passenger and thus the time between two transit units occupying the same station or space.

n_{\max} : maximum veh/TU

4. Line Capacity (C): maximum number of passengers that can be transported past a fixed point (a station or a stop) during a unit time (usually per hour) under set conditions.

$$C = c \cdot c_v = f_{\max} \cdot n_{\max} \cdot c_v$$

Where:

C = sps/hr

5. Operating Capacity (C_o): Same as line capacity however, 'n' and 'f' are not maximum.

$$C_o = f \cdot n \cdot c_v$$

C_o = sps/h (actual or estimated)

f = not max

n = not max

6. Scheduled Line Capacity Utilization Coefficient (δ). Units: dimensionless

$$\delta = \frac{c_o}{C}$$

7. Passenger Volume (Actual): Actual number of passengers that use the public transport system (prs/hr)

$$P = \alpha \cdot c_o = \alpha \cdot \delta \cdot C$$

Where:

P = prs/hr

δ = dimensionless, scheduled line capacity utilization coefficient

α = prs/sps (load factors, spaces usually include seats and standee spaces)

C or c_o = sps/hr

8. Number of Transit Unit Needed

- a. No peak period (general)

$$T = \left\langle f \cdot t_m \right\rangle = \left\langle \frac{c_o \cdot t_m}{c_v \cdot n} \right\rangle$$

Where:

T = number of transit units (TU's)

f = frequency TU's/hr

t_m = minimum round trip cycle time in hours (hr)

{ } = smallest integer continuing (next integer)

Note: number of vehicles needed (train vehicles, for buses the number of transit units is the same as the number of vehicles) is (T * n_{max})

- b. Peak period duration is greater than the round trip cycle at peak period

$$\text{Given: } t_m^p \leq t_p$$

$$T = \left\langle f^p \cdot t_m^p \right\rangle = \left\langle \frac{t_m^p}{h^p} \right\rangle = \left\langle \frac{c_o^p \cdot t_m^p}{c_v \cdot n^p} \right\rangle$$

Where: the superscript p and b means at peak period or at base period respectively. All other symbols are defined earlier.

- c. Peak period duration is less than the round trip cycle at peak period

$$\text{Given: } t_m^p > t_p$$

$$T = \left\langle \frac{t_p}{h^p} \right\rangle + \left\langle \frac{t_m^p - t_p}{h^b} \right\rangle = \left\langle \frac{c_o^p \cdot t_p}{C_{TU}^p} \right\rangle + \left\langle \frac{c_o^b \cdot (t_m^p - t_p)}{C_{TU}^b} \right\rangle$$

Where: All symbols previously defined.

9. Transportation Work: Total public transport network operations in vehicle-kilometers per unit time, from which network variable cost may be estimated.

$$W = \sum_{i=1}^j L^j \sum_{i=1}^j f^{ij} . n^{ij} . t^{ij}$$

Where:

W = veh-km/day or month or year

L = round trip length, km

t^{ij} = total time length of a period of set service and within a set zone.

j = index of zone

i = index of period of different service

Demand Analysis

Demand analysis in general would have the sequential prediction models of trip generation, trip distribution, modal split and traffic assignment. What we are most concerned with in this study is the modal split of the trips distribution between an origin and a destination. This may involve field surveys to determine the demand per hour (or for parts of an hour, 15 minutes). Also, for a transit route the demand is not only from the origin but from the stops on the route. The modal split modeling is essential to the study of public transit operation to understand the changes of demand based on main performance criteria of the various modes and especially including in the analysis the private auto. Furthermore, it is worthy to understand the elasticity of the demand compared to changes of tariff. The following is a theoretical background of the modal split modeling and the elasticity of fares and ridership.

Modal Split model:

The most used model for modal split is the Multinomial Logit Model, which is a probabilistic model using microeconomic disutility functions. The modal split model, if calibrated based on data of several years and routes, would be able to predict the percentage of ridership for each of the available modes (e.g., for the West Bank case, bus, shared taxi, private auto), especially for changing trip costs and performance criteria of some modes.

$$p(K) = \frac{e^{U_K}}{\sum_x e^{U_x}}$$

The Disutility concept:

$$U_i = \mu_0 + \mu_1(T) + \mu_2(WT) + \mu_3(D)$$

μ_0 = general disutility

μ_1 = value of travel time

μ_2 = value of waiting time

μ_3 = cost/ km

T = in-vehicle time

WT = waiting time

D = travel distance

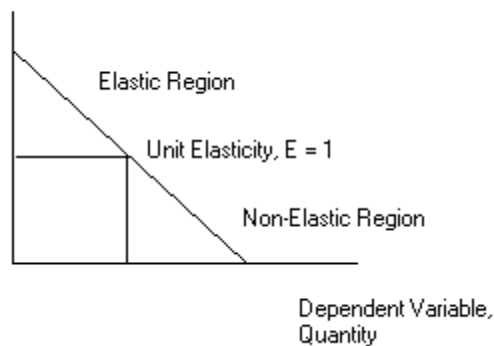
P(K): the probability a person will select mode (k) or the percentage of riders on this route that will select mode (k).

Effect of elasticity (especially fare vs. ridership)

Elasticity = E

$$E = \frac{\% \Delta \text{ dependent variable}}{\% \Delta \text{ independent variable}} = \frac{\Delta D / D}{\Delta I / I} = \frac{dq}{dp} \frac{p}{q} = \frac{\Delta Q / Q}{\Delta P / P} = \epsilon_P$$

Independent Variable, Price



Discussion: If Elasticity is unity (1.0) then the percentage of increase of the independent variable (e.g., price) would cause same percentage decrease in the dependent variable (e.g., ridership).

Review of Guidance Procedures Manual for Public Transport

The Guidance Procedures Manual for Public Transport is a document of 33 pages in Arabic. It provides detail procedures for personnel in the public transport section in the Palestinian Ministry of Transportation to conduct various daily tasks, such as the requirements for registration of a bus, a shared-taxi, or call taxi; in addition to diversion of shared taxi from one route to another, removable of the location a taxi company's office, etc. Thus, the manual serves the purpose of providing clear instructions and

procedures for personnel working on such tasks. A component of this study is to organize the system of data input and make databases more user-friendly. Annex 3 provides Draft Terms of Reference (ToR) for Development, Supply, and Implementation of Public Transport Management Information System (PTMIS).

What missing in this manual or need to be addressed in another relevant document is the policies for renewal of bus line concessions procedures, evaluation of numbers of shared taxis per route, and the number of call taxis needed for each city.

A renewal of bus line concession should be subject to meeting the minimum required performance criteria set by the MOT. An annual evaluation report for each bus route based on the bus operator's annual report and other performance monitoring methods should be conducted. The outcome for the report should be the basis for renewal of bus lines concession to specific operators. It is recommended that if the evaluation report finds an operator not meeting the minimum required performance criteria there should be several suggested options, among them:

- If the violation of the set standards is limited; a guidance to meet the required standard by next year's evaluation should be requested
- If the violation is substantial, a warning should be issued to an operator to comply with the specifications in a given period of time between one month and one year; depending on the urgency and severity of the violations of not adhering to the set performance criteria.
- If an operator receives two (or three) warnings; the concession for the bus route would be temporarily revoked for one to two years.
- By the end of a set period for a bus line's temporary concession cessation; a plan for the adherence to the performance criteria should be provided to the MOT by the operator. If the provided plan is suitable then the bus route concession will be granted again; otherwise the temporary cessation will be extended or a permanent cancellation of the route concession rights to the specific operator should be executed. Meanwhile during the period of the temporary concession cessation for a bus company of particular route; another bus company will be given the temporary rights to serve this route according to a set performance criteria.

The shared-taxi routes should be evaluated annually based on the performance criteria, especially via the annual operators' report and other monitoring methods. There are two types of evaluation needed:

- Evaluation for the shared taxi routes, especially comparisons of demand to the number of taxis serving each route. A decision would be to maintain the same number of taxis for a specific route, increased it if a clear evidence of need is provided, or request a lower number of taxis for this route, if needed, via transferring taxis to other routes. Also, the reduction of the number of taxis may be done based on individual evaluation for each taxi as in the next item.
- Evaluation for each taxi and driver, or drivers, for the same taxi should be performed before renewing the permit for each taxi on the line. The condition of the

vehicle and the performance of the driver/driver's for the previous year should be evaluated; particularly, the safety record and passengers satisfaction, based on a compliant system for shared-taxi passengers. In addition, to considerations for violations to route assignment or working as a call taxi.

The call taxi office in each city should be evaluated before renewing their license as a taxi office in general, and also in terms of the number of taxis allowed to operate. A city by city evaluation is needed to determine the level of operations for each taxi and compliance to operate according to the set mandate and performance criteria. Of particular interest is the violation of call taxis to work as shared taxis on various routes; in addition to the compliance to use the tariff meters and safety records.

Public Transit Tariff

In the WBG, the public transport is rarely directly subsidized. However, the PA has provided indirect subsidies to the public transit sector through waiver of customs on the purchase of all public transit vehicles, where the customs on vehicles were 75% of the purchase value and only recently (in the past few months) the customs on vehicles were reduced to 50% of the purchase value. Thus, it is estimated that about 10,000 public transport vehicles (buses and taxis) were registered since the inception of the PA in 1995. There were only about 500 buses and 1500 taxis in the West Bank before the establishment of the PA, and currently there are about 703 buses and 9850 taxis (of all types) in the West Bank. Thus with replacement of some old taxis and buses; the number of new registered transit vehicles since the inception of the PA was estimated at 10,000 vehicles and given the average estimated price for each vehicle is NIS 150,000 (this is rough weighted average cost per vehicle for all transit vehicles purchased in the past 15 years including full size used buses, mini used buses, new and used shared taxi vehicles; the estimations is based on information from transit operators and government officials). Thus for a customs of 75% of the purchase value of vehicles; the custom's waiver by the PA in the past 15 years amounts to NIS 1,125 million or about US\$300 million. In addition, the cost of permit renewals for bus routes and registration costs for buses is nominal. A rough estimates for the subsidy provided per capita per year is only about US\$7; while in comparison in study in Australia (Ref. 14), the public transit subsidy per person per year 2009 in Sydney was about 900 Australian dollars (US\$765) and in Darwin 200 Australian dollars (US\$170). Many governments provide some form full or partial custom waiver for public transit vehicles along with direct operation subsidies. In India there is currently a pending request from the Ministry of Urban Development to the Ministry of Finance to waive all taxes and duties on buses, but not yet approved.

Private transit operators are mainly the bus and shared taxi. The MOT sets minimum performance criteria and tariff for granting route permits. Thus setting a fair tariff for both the operators and the public transit passengers is an essential task. There were no methods or formula used for estimating tariffs for the various routes and for each of the two public transit modes. This is the first attempt to establish procedures for calculating and estimating public transit tariff in the WBG.

The main objective is to establish viable tariffs for current service levels, without subsidies at this stage. ‘Viable’ means that revenues are sufficient to enable an efficient and diligent Operator to cover all costs of service provision, including the financing costs of vehicles, correct maintenance, the statutory obligations to personnel, and adequate regulatory and safety compliance. Then to be able to establish tariffs for various changes of conditions among them service levels and subsidy options. Hence, this study aims at providing information to the MOT to be able to develop a vision and a policy for tariff estimation of public transport. It should be emphasized that there are many uncertainties for the MOT and operators, especially the duration of trips due to check points and force changing of routes due to closure of roads by the occupation forces. Despite the importance to emphasize such uncertainties; this should not be an excuse (especially by the operators) to not organize public transport operations. This is another serious challenge that must be dealt with.

The following are components that influence tariff formulation, there are outline below in five categories:

I. Cost of operation

1. Fuel cost (rate and fuel consumption per kilometer) per vehicle type per model for urban and for inter-city driving (for buses and shared taxis)
2. Cost of vehicles or annual depreciation cost (cost of new or used vehicles, service life, salvage value and rate of return or bank loan interest)
3. Annual maintenance and repair cost for vehicle type and model, including spare parts
4. Consumables (tires, lubricants, filters, ...)
5. Annual registration and permit fees
6. Annual insurance cost
7. Taxes
8. Drivers’ monthly salary (48-hr week), or daily salary, especially for buses and shared taxi drivers. In addition to overtime cost and cost for working during night and holidays, and training. There are currently no conductors on most bus operation, but if so, their salaries must be included in cost of operation.
9. Operations management and supervision
10. Cost of premises and facilities
11. Administration cost
12. Annual kilometer traveled per vehicle (between vehicle’s inspection); in order to determine the average cost per kilometer for the fixed annual and/or monthly costs

II. Demand (ridership)

1. Current percent occupancy rates: average per peak and off peak hour and direction and per vehicles size for buses and shared taxis (general averages for buses and shared taxis)
2. Number of round trips on the route per day (per average day)

3. Expected percent occupancy and average number of trip per day for fixed schedule operation for buses (as it does not exist at most routes in the West Bank in the present time)

III. Other sources of revenues

1. Field trips for schools, weddings, and special events
2. On-bus and on-terminals and stops advertisements, if applicable

IV. Profit Margin

It is obvious that no private business works for fee or without any profit. Thus a minimum profit margin must be set for public transit operators. The profit on public transit operations (on tariff) may be lowered if some profitable elements such as field trips and advertisements boards on transit vehicles continue to be allowed and are maximized by the operators without affecting transit operation's level of service. The percentage of profit margin may vary depending on volume of ridership; hence the margin of profit should be more linked to the total profit per year compared to the amount of investment.

V. Other factors affecting tariff estimation

1. Competition: between transit modes and with private auto
2. Affordability (percent of community below the poverty line, percent unemployment, etc.)
3. Vulnerable groups special rates: elderly, women, students, children, and persons with disabilities
4. Variable rates for service periods: peak, off-peak, night, etc.
5. Variable rates for route demand: strong demand routes vs. poor demand routes
6. Uncertainty for time and duration of trips due to occupation checkpoints and road closures

Tariff Calculations Procedure for Public Transit in the WBG

The calculation of the tariff recommended for the public transit operation in the WBG is based on the above tariff components. An interactive and user-friendly template was developed with sample routes calculations. The template is comprehensive and includes all possible tariff components; yet flexible and may be used for various modes, routes, and operational options. In addition tariff components may be added or omitted. The designed template includes 40 columns, out of which 28 columns are input data, information or decision making parameters. The remaining 12 columns are calculated. The accuracy and usefulness of the tariff formulation is directly related to the accuracy of the input data. Annex 4 provides the template's spread sheet and sample data and calculation of tariff estimation for several buses and shared taxis routes.

The input data columns were reviewed and discussed with the client and stakeholders. The input data for the provided routes examples were obtained via a questionnaire to the bus companies operators' association and the shared-taxis' association (The questionnaires, in Arabic, are provided in Annex 2). In addition, the data was further refined through interviews and interactions with associations of bus companies and shared taxi companies. The approval of the input data should be provided by the client, the Palestinian Ministry of Transportation. Needless to say there are various endeavors for the values of the input data, and studies monitored by the MOT are essential for the validation of the used input data. Furthermore, the data is not constant and changes by time, especially the ridership values and the number of round trips; thus periodic checks and studies are needed. The ridership data are also expected to change if set schedules are enforced.

The tariff calculation in template spread sheets are provided in Annex 3, where each column heading is written in English and Arabic for the benefit of users. Also most input columns have detail explanation in footnotes. The template was designed so when data is inserted or changed for any route, the calculation are performed automatically. Default data may be used by comparisons to example routes provided.

A critical component of the tariff estimation is the number of trips for each vehicle per day. Some actual values indicate shared taxis provide only one trip per day or even per week (such as the Nablus – Jordan bridge route in the winter months); thus calculation of the tariff could be grossly overestimated and unrealistic. This is due mainly to the very high number of shared-taxis for certain routes. Hence, this tariff estimation must be performed for the required or a reasonable number of transit vehicles for each route. Another complication is the competition of the bus and shared taxi modes. The number of required vehicles for each of the two public transit modes on each route needed is subjective and based on political lobbying. It must be noted that many of the shared-taxi permits granted at some time for various routes were based on social aspects, namely finding work opportunities for taxi drivers. Furthermore, the lack of demand compared to the registered vehicles for a given route caused lack of sufficient work; hence encouraged violations by such drives to work on other routes and as a call taxi.

The calculation of the tariff is mainly based on costs and average ridership, and it is a tariff or fare for one-way trips. However, this exercise calculation could be complicated if various fare options are introduced. In such cases, overall operational cost should match revenues for a break-even point. However, a profit margin is essential for private operators, and thus revenues should exceed overall cost with a set minimum percentage of overall cost. Fare options provide incentives to increase transit ridership, especially at off-peak periods, which is highly recommended. Some of the fare options used worldwide is the following:

1. Fare per single trip at anytime (distance based, that may be segmented for intermediate zones, or flat rate for all stops per route)
2. Fare per single trip at various service periods (e.g., higher rate at night and lower rate at daytime off-peak periods)

3. Period passes: daily, weekly, monthly, annually
4. A pass for a number of trips (5, 10, 20, etc.)
5. A transfer pass
6. Special rates for elderly (senior citizens), students, and children

In addition to the possible fare options, the fare collection methods could also provide incentive to potential users and could contribute to a positive image of the public transit system. Smart cards are increasingly used in public transit systems worldwide, but also they have been used regionally, e.g., in Jordan. Some of the fare collection methods are outlined as follows:

1. Single trip ticket purchased from driver (or exact change drop bin)
2. Single or multiple tickets or passes per number of trips purchased from offices, automatic dispensing machines, etc.
3. Passes (daily, weekly, monthly, etc.) purchased from offices, automatic dispensing machines, etc.
4. Transfer pass: given upon request by drivers for limited period of transfer to another line
5. Contact and contactless card (smart cards): that may be recharged and deducts monetary amounts per trip at various periods of service (may have various options such as peak and off-peak rates)

Conclusion and Recommendations

The main benefit of the conclusions is to understand the current status quo of the Palestinian public transit sector and the reasons for such conditions. However, it must be emphasized not to just list the recommendations, but to find practical and suitable methods to implement them. The following are the main conclusions and recommendations of this study:

- Public transit sector has been given a high priority by the PA; however, it suffers from limited resources and poor services. Hence, it requires substantial attention and support by PA.
- The public transit services have suffered and continue to suffer due to the occupation practices; particularly blockade of Jerusalem (the public transport hub in the West Bank), road closures, checkpoints, and travel restrictions on Palestinians.
- The bus transit mode needs the most support, including regulation, monitoring, and subsidies, especially for fleet renewal, maintenance facilities, and bus depots. In addition to upgrading of terminals and bus stops.
- Image of the public transit needs to change and drastically in order for this vital sector to gain respect and patronage. Reliable scheduling that is well publicized, along with improved conditions of buses, terminals and stops are essential to influence an image change of the public transit system.
- Restating a recommendation from previous studies to conglomerate the bus company's operators in three companies or associations in the West Bank. Very small bus

companies operate inefficiently and without minimum flexibilities and possible innovations.

- There have been some minor improvements in the management of public transport sector within the MOT in the past few years; however, this sector within the MOT needs substantial support in staff and funds, especially to support the monitoring of public transit operations in the various regions
- There is a need to regulate various performance criteria, particularly public transit operation time and headway at various periods (or a set schedule)
- Monitoring of public transit performance criteria is an essential task to improve the poor public transit service. This is a major task that needs staff and funding.
- There should be a direct correspondence between tariff estimation and the quality of service provided
- Calculation of tariff estimation via the provided methodology is meaningless, unless there is agreement about performance criteria and most notably set schedules (headways for various periods of the day) and meeting peak demand passengers
- The renewal of route permits should be contingent to achieving minimum performance criteria
- The performance criteria should be monitored by various means (as outlined in this study) in order to validate the accuracy of the information
- There are exceptional high number of shared-taxis for many routes, and since these taxis queue for their turn to fill up with passengers; thus on the average each vehicle would only operate few trips per day for some routes. Thus higher tariff would be needed to make such limited number of trips sufficient to make a living to taxi drivers/owners. The MOT recognized that no additional permits for existing or new routes should be provided, except after careful studies and justifications for need. Furthermore, diversion of taxis permit from routes with high number of taxis to those with lower number of taxis is also recognized as a need by the MOT; these policies need to be reinforced.
- The provided tariff formulation method through a spread sheet template is only as accurate and relevant as the provided data inputs. Thus validation of data from various sources (or conducting of pertinent studies) to obtain such data is of paramount importance.
- It is essential to improve the database systems of the MOT, especially in regard to public transit records and data. A component of this study has provided the MOT with technical assistance to store, back-up files, retrieve, and manage databases. However, this is a continuing process and the system of entering and storing data must be maintained.
- Definition of a bus by MOT states it is a vehicle used for public transit that has a seating capacity greater than 8. It is recommended to use a more generic definition for a bus, namely, a public transport vehicle that is high enough for passengers to walk standing up, and it should have a seating capacity of 16 or more passengers.
- The subsidies for public transit may be in numerous forms (not necessary direct monetary subsidies); such as free or lowers customs on purchases of new buses and taxis (which is currently implemented) and spare parts, reduction of fuel tax, reductions of registration and permit fees, reduced insurance rates, etc.

- Another indirect subsidy is to provide paid tickets for government employees and some marginalized groups such those with disability. Currently government workers are being reimbursed for transportation expenses; as an encouragement and indirect subsidy for the public transit this reimbursement could be changed in form to be paid transit tickets or passes.

Action Plan

Setting public transit performance standards and monitoring it; in addition to estimating tariff for the bus and shared taxi modes for the numerous lines in the WBG according to the outline methodology that includes tens of influencing factoring needs a large team of employees. The Palestinian Ministry of Transportation, and particularly the public transit division within it, is grossly under staffed. Of course highly efficient databases are required to help the process, but this does not substitute for the need to substantially increase the staff of the public transit division in the MOT. This also should include stationing of personnel at the various governorates and districts. Setting performance criteria without monitoring the required set criteria would be only a theoretical exercise of futility. Furthermore, it must be clearly stated that if the required staff of the public transit division within the MOT is provided, but they are inefficient, or incompetent, or/and are corrupt then such increase of staff could be a waste of resources without obtaining the required benefits.

The benefits expected from the action (implementation) plan is to significantly improve the public transport image and standards in the WBG and periodically estimate tariff based on cost, demand and other factors that influence tariff formulation. The tariff estimation should be based on periodic estimation of key criteria such as number of trips per route and average percent occupancy of transit vehicles. Some of the basic criteria need to be estimated on a more distant time period, such as fuel consumption for various vehicles types and route geometric design and traffic conditions.

A high performance public transit system not only benefits the current passengers for such a system; but it is expected that the ridership would increase substantially. Moreover, an efficient public transit system would mean diversion of shared-taxi users to the bus transit mode. Therefore, such a diversion would result in national saving of fuel, capital (less cost for transit vehicles), a substantial less need for parking spaces in the Central Business Districts (CBD), reduction of traffic congestion, and also less air and noise pollutions. Furthermore, a high performance public transit would indirectly stimulate the economy and improve social – economic conditions for the population served by public transit.

Given the above background; the following action plan is recommended for setting transit performance criteria and monitoring such criteria, as well as estimation of tariff for the various public transit modes and routes (an action plan summary is provided in Table 4):

- Increase the personnel for the public transit division within the MOT. This could be performed at various stages 3-5 new employees per year for the next five

years. However, at the end of each year there should be an evaluation of the work performed and improvements provided to the transit sector. An additional increase of the staff for the next year should be justified, or/and if the current hired staff in the previous year is not suitable, it should be replaced.

- Training for the current staff to set performance criteria, especially estimation of transit frequency (scheduling) based on current demand levels. Also training on the calculation of the minimum number of transit vehicles of certain size, especially to meet peak period demand. Moreover, the training will include the monitoring methods and usage of tariff estimation methodology, including supervision of studies to obtain the required input data.
- Setting of performance criteria and tariff for each transit mode (bus and shared-taxi). This would require some basic studies including the following:
 - Fuel consumption of various transit vehicles and routes
 - Distance and average travel time for each route and each mode
 - Number of trips for each direction per day per route per mode; and thus the average number of one-way trips per vehicle per day could be estimated
 - Average percent occupancy of the all trips in both direction for each route

The above requirements are substantial and require considerable efforts. Thus basic estimates are required for the 1st year with the limited number of staff. Hence, providing estimates of the above main input criteria, along with estimates for the other criteria from transit operators' records and interviews enables trained personnel to set performance criteria and tariff. The following is recommended for at least the 1st year:

- The tariff should not be reduced for any transit mode or route; also increasing the tariff above the estimated value by a moderate percentage to reach agreement with operators, especially if there are uncertainties or the data used to obtain the estimation for the input criteria is not sufficient or not reliable.
- The scheduling, especially for off-peak periods, should be the minimum required and should be reasonable to the operators. Thus it is not important how long the headway between successive transit vehicles, but more importantly to adhere to the agreed upon and announced schedule.
- Monitoring methods for performance criteria. This could be the most critical task; not only it is time consuming, but it has not been implemented for decades in the WBG. There are various monitoring methods outlined in this study that

should be used to complement one another and to verify information. The operators' annual report is a main source of monitoring; however, reviewing, storing, and retrieving the information for analysis and comparisons among the various routes are critical tasks that could help improve the public transit standards.

- Based on the annual evaluation for operation of each route and mode of public transit; the decision makers within the public transit division of the MOT must reach a decision for each route and mode of transit regarding continuing the permits rights. There should be a systematic procedure for the decision process that should involve a limited committee and the decision of the committee should required endorsement by a high ranking official of the MOT. The decision for bus routes should be one of several options, which could include the following:
 - Renewal of route permit without remarks or qualifications
 - Renewal of route permit with remarks or/and qualifying conditions
 - Renewal of the route permit with a warning and set requirements to be implemented within a set time period of year or less
 - Temporary revoking of route permit right and giving such right to a qualified public transit company for a period between one and three years (and may be renewable for up to three years)
 - Permanent revoking of route permit (which should only be performed after a temporary revoking of route permit and operator's company unwilling or unable to fulfill the minimum performance criteria)

The decision for renewing shared-taxi permit is of two folds:

- a) A need to reduce the number of vehicles (shared-taxis) on such a route. This may be performed by encouraging shared taxis to transfer to an underutilized route or providing some incentives for lower quality vehicles to abandon route permit. This should be possible for the permits that are renewable on an annual basis.
- b) To renew a permit for each vehicle based on vehicle's and drivers' of vehicle performance in the past year; where the options could include:
 - to renew without conditions
 - renew with condition to be met within a specified period of one year or less

- to impose penalty, temporary or permanently revoking of route permit (permanent revoking of a permit should be preferably done after a temporary revoking of permit, but in this case the vehicle would be out of work and may be the owner and/or driver would accept permanent revoking of permits given waiver of penalty or other incentives, especially if route has over proportionate number of shared-taxi vehicles).
- A review of this action plan and the study for setting and monitoring performance criteria and estimation tariff should be conducted after three years from the start of implementation of the action plan. Revisions should be introduced where appropriate based on technical evaluation, and certainly the decision for introducing the revisions should be solely within the hierarchy of the MOT. Again a special committee of the public transport division should provide their recommendations for endorsement of a high ranking MOT official.

The action plan is bold to request for a substantial increase of staff and to suggest for temporarily or permanently revoking of routes' permits for bus operators or shared-taxis not meeting the required performance criteria. This is something that has not been done before, but it is clearly within the authority of the MOT. Hence, clearly showing the evidence for not meeting the set performance criteria is essential. Route permits are granted based on providing a minimum level of service. Hence a firm implementation of the action plan, including temporary and permanently revoking of route permits for some bus operators and shared-taxis, if justified, is of paramount importance to change the image and substantially improve the level of service for the public transport system in WBG.

Table 4: Action Plan Summary

Action	Responsible	Completion Date
Increase the personnel for the public transit division within the MOT. This could be performed at various stages 3-5 new employees per year for the next five years.	Deputy Ministry	August 1, 2010 (for the 1 st year)
Setting of performance criteria and tariff for each transit mode (bus and shared-taxi)	Head of Public Transport division	September 1, 2010
Monitoring methods for performance criteria of public transit modes	Head of Public Transport division	End of each year
Annual evaluation for operation of each route and mode of public transit; the decision makers within the public transit division of the MOT must reach a	Head of Public Transport division	End of each year

decision for each route and mode of transit regarding continuing the permits rights.		
A review of this action plan and the study for setting and monitoring performance criteria and estimation tariff	Deputy Ministry	August 1, 2013

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Annex 1: Summary of the 1st and 2nd stakeholder's meeting

Public Transport Performance and Tariff Study Project Funded by the World Bank For the Benefit of the Palestinian Ministry of Transportation

Summary of 1st Stakeholder's Meeting

Date: March 28, 2010

Time: 11:00 – 14:00

Location: Ministry of Transportation, Ramallah

Attendance: 20 participants

The agenda:

- Welcoming speech and an overview of ministry's policies, projects, and plans for public transport by Dr. Ali Shaat, Deputy Minister, Ministry of Transportation
- An overview of the project, Eng. Ibrahim Dajani, World Bank
- A PowerPoint presentation of the objectives of the project and the meeting by Dr. Faisal Awadallah, consultant of the project by the World Bank
- Exchange of views and input from the participants, directed by Dr. Faisal Awadallah

The Participants:

There were 20 participants attending the meeting (a list of participants and their contact information in Arabic is attached). The participants included chairmen and members of the associations of bus companies, association of shared taxis companies, and public transit drivers' association. The participants also included government officials, especially from the Ministry of Transportation and consultants. In addition, the association of persons with disabilities (physically challenged persons) attended with three members. Unfortunately, two Non Government Organizations (NGO), namely "AMAN", and "Residents Right" that were invited to the meeting could not come. It was emphasized to invite them again to the next meeting along with a mayor or/and members of one or two municipal councils.

Summary of the Meeting

Dr. Ali Shaat, Deputy Minister, Ministry of Transportation welcomed the participant and stressed the importance of the public transport sector. He provided a comprehensive background of the project and the previous public transport projects conducted for the benefit of the Ministry of Transportation. In addition, Dr. Shaat provided the audience with future plans of the Ministry and general policy for this important sector.

Engineer Ibrahim Dajani provided a briefing of the various projects conducted by the World Bank for the benefit of the Palestinian Ministry of Transportation. He stressed the importance for conducting such a meeting with the stakeholders and emphasized the views of the World Bank how such meetings are of benefit to the project. Engineer Dajani requested all participants to cooperate with World Bank consultants to include all various views and to provide the necessary input for the consultant team.

Dr. Faisal Awadallah gave a PowerPoint presentation, which provided an overview of the project objectives and outlined what is expected from the participants and meeting in general, then he gave the floor to participants to focus on following four areas:

- General comments: Among the general comments were the input from the members of association of people with disabilities that stressed that public transit should have facilities for wheel-chaired persons and other special facilities for the disabled. Furthermore, it was pointed out the need to provide reduced fares for physically challenged people.
- Tariff criteria: Most of the input concentrated on this topic, and most input stressed the limited profit or working with loss in the public transit sector and there is a need to increase the fares. This particular input came mainly from the association of bus companies, association of shared taxi companies and public transport drivers' association. In addition, there were many examples of weak transit lines and high operational costs.
- Performance criteria: The participants from the associations of bus and shared taxi companies stressed that the occupation check points and detours hinders adherence to performance criteria, especially reliability of schedule. However, they had to admit there is room of improvements to the "no fixed" schedule situation of many bus routes. In addition, they have pointed to the difficult economic situation, especially bus companies not being able to renew the bus fleet.

Follow up

The contact information of all participants was obtained and a questionnaire in Arabic was prepared for each of the association of bus companies and the association of shared taxi companies. The questionnaires solicit input on various cost components of public transit operation, average transit vehicles occupancies, and other relevant information to the study. However, care must be taken in using such data since there is an interest by these associations to exaggerate the operational costs and to reduce the ridership estimates. Meetings would be scheduled with key personnel.

Public Transport Performance and Tariff Study
Project Funded by the World Bank
For the Benefit of the Palestinian Ministry of Transportation

Summary of Stakeholder's 2nd Meeting

Date: April 20, 2010

Time: 11:00 – 13:00

Location: Ministry of Transportation, Ramallah

Attendance: 18 participants

The agenda:

- Welcoming speech and an overview by Dr. Ali Shaat, Deputy Minister, Ministry of Transportation
- A PowerPoint presentation of the report, in addition to an EXCEL demonstration of the tariff calculation methodology by Dr. Faisal Awadallah, consultant of the project by the World Bank
- Responding to questions and an open discussion by the participants, directed by Dr. Faisal Awadallah

The Participants:

There were 18 participants attending the meeting (a list of participants and their contact information in Arabic is attached). The participants included chairmen and members of the associations of bus companies, association of shared taxis companies, and public transit drivers' association. The participants also included government officials, especially from the Ministry of Transportation. In addition, the association of persons with disabilities and "AMAN, "Residents Right" attended as Non Government Organizations (NGO's). There were other NGO's and Municipalities members who were invited but could not attend.

Summary of the Meeting

Dr. Ali Shaath, Deputy Minister, Ministry of Transportation provided the opening welcoming statement to the participant on behalf of H.E. Minister of Transport Dr. Saadi Al-Krunz and presented a comprehensive background of the project.

Dr. Shaath stressed the importance of the project and endorsed its approach and methodology; especially the interactions between the consultant and the stakeholders, not only through official stakeholders meetings, but also through various meetings and responding to filling of the questionnaire provided by the consultant to the operators of bus and shared taxi lines.

Dr. Shaath stressed the importance of this meeting, and stated it is another proof that the Ministry is keen to develop this mechanism in a partnership manner with the service providers from the private sector as well as with participation from the public and NGO's. He wished the participants a fruitful and constructive interaction in order to work together to advance the vital public transport sector.

Dr. Faisal Awadallah gave a PowerPoint presentation, which provided an overview of the project objectives and outlined of the final draft report of this study (power point presentation is attached). The presentation outlined the performance criteria and grouped them in three categories; namely:

- Basic or eligibility criteria for operation
- Regulatory authority criteria for operation,
- Quality or level of service

The presentation also included the monitoring methods and the components that influence tariff formulation, there were outlined in five categories as follow:

- Cost of operation
- Demand (ridership)
- Other sources of revenues
- Profit Margin
- Other factors affecting tariff estimation

Comments on the performance criteria, monitoring methods and the components of tariff were very limited and mostly clarification or additional explanation of the content of the presentation. The consultant requested specific comments, especially addition of any missing tariff component. But there were no additions. Some remarked that may provide comments when they could read the entire report.

Furthermore, the conclusion and recommendation of the report were presented and found acceptance from the participants. Finally an excel example for the formulation of tariff was explained for Birzeit- Ramallah bus route as a case example from data provide by the manager of the operating company of this line. There were interactive changes of the some input data numbers based on a consensus from the participants. The final calculation columns for the tariff were at first hidden, but when all changes have been agreed upon the results were shown. The estimated cost of passenger per trip was substantially lower than the current tariff. Even after the MOT requested to use a 20% profit margin the calculated tariff was about the same as it is now. Other lines for bus and shared taxis were view with data provided from the operators without changes during the meeting and most calculated tariffs were within 20% of the existing tariff both higher and lower. However, it was emphasized that these input data must be checked, refined, and agree upon by the MOT before coming to any final conclusion. At the end of the meeting most participants thought the procedure is clear and reasonable; however, some, including the manager of the Birzeit Bus Company was not pleased with the results. Even the data he provided in the questionnaire few days ago; he stated it is not accurate (he misunderstood or misestimated some values) and he needs to make adjustment to it.

The meeting closed on a positive note, that most participants think the components for the tariff and performance criteria and monitoring methods are reasonable and they are willing to study the report and procedures for calculations of the tariff. All the participants agreed upon the importance of providing accurate data.

Annex 2: Questionnaires soliciting data input needed for Tariff Estimations.

نموذج خطوط الحافلات

1 - استهلاك الوقود، كيلومتر لكل لتر (كم/ لتر)

أ. للحافلات الكبيرة الجديدة (أقل من 5 سنوات) _____

ب. للحافلات الكبيرة غير الجديدة (أكثر من 5 سنوات) _____

ج. للحافلات الصغيرة الجديدة (أقل من 5 سنوات) _____

د. للحافلات الصغيرة غير الجديدة (أكثر من 5 سنوات) _____

2 - استهلاك الوقود، أثناء الانتظار (Netural)، دقيقة لكل لتر (دقيقة / لتر)

أ. للحافلات الكبيرة _____

ب. للحافلات الصغيرة _____

3 - سعر التأمين السنوي

أ. للحافلات الكبيرة (جديدة وتأمين شامل) _____

ب. للحافلات الكبيرة (قديمه وفريق ثالث) _____

ج. للحافلات الصغيرة (جديدة وتأمين شامل) _____

د. للحافلات الصغيرة (قديمه وفريق ثالث) _____

4 - رسوم الترخيص والبرميت السنوي

أ. للحافلات الكبيرة _____

ب. للحافلات الصغيرة _____

5 - ضرائب سنوية لكل حافلة

أ. للحافلات الكبيرة _____

ب. للحافلات الصغيرة _____

6 - تكاليف الصيانة الدورية السنوية

أ. للحافلات الكبيرة _____

ب. للحافلات صغيرة _____

7 - تكاليف التصليحات السنوية للحافلات القديمة (أكثر من 5 سنوات)

أ. حافلات كبيرة _____

ب. حافلات صغيرة _____

8 - تكاليف أخرى سنوية (حدد : نوعية التكلفة وقيمتها)

أ. حافلات كبيرة _____

- _____ .1
- _____ .2
- _____ .3
- _____ .4

ب. حافلات صغيرة

- _____ .1
- _____ .2
- _____ .3
- _____ .4

9 - أجره السائق اليومية _____ أو الشهرية _____

10 - معدل الدخل السنوي لكل حافلة من رحلات، مناسبات، مواد دعائية الخ.

أ. للحافلات الكبيرة _____

ب. للحافلات الصغيرة _____

11. سعر تكلفة الحافلة

أ. كبيرة جديدة _____

ب. كبيرة قديمة (10-12 سنة) _____

ج. صغيرة جديدة _____

د. صغيرة قديمة (5 - 7 سنوات) _____

12. سعر الحافلة بعد عمر الخدمة المسموح (18 سنة)

أ. حافلة كبيرة _____

ب. حافلة صغيرة _____

13. إعطاء أمثلة لخطوط محددة بخصوص ما يلي :

أ. خط _____

1. عدد الرحلات اليومية ذهاباً وإياباً لكل حافلة _____

2. نسبة عدد الركاب لكل رحلة (عدد الركاب من العدد الأقصى المسموح به ونسبة مئوية) لهذا الخط يومياً _____

3. طول الرحلة (المسافة) _____

4. زمن الرحلة في ساعات الذروة _____

5. زمن الرحلة في ساعات الحركة البطيئة _____

6. التعرفه الحالية.

7. توقع سفر الحافلة بالكيلومترات سنوياً _____

8. ملاحظات أخرى.

ب. خط

1. عدد الرحلات اليومية ذهاباً وإياباً لكل حافلة.
2. نسبة عدد الركاب لكل رحلة (عدد الركاب من العدد الأقصى المسموح به ونسبة مئوية) لهذا الخط يومياً
3. طول الرحلة (المسافة)
4. زمن الرحلة في ساعات الذروة
5. زمن الرحلة في ساعات الحركة البطيئة
6. التعرفه الحالية.
7. توقع سفر الحافلة بالكيلومترات سنوياً
8. ملاحظات أخرى.

ج. خط

1. عدد الرحلات اليومية ذهاباً وإياباً لكل حافلة.
2. نسبة عدد الركاب لكل رحلة (عدد الركاب من العدد الأقصى المسموح به ونسبة مئوية) لهذا الخط يومياً
3. طول الرحلة (المسافة)
4. زمن الرحلة في ساعات الذروة
5. زمن الرحلة في ساعات الحركة البطيئة
6. التعرفه الحالية.
7. توقع سفر الحافلة بالكيلومترات سنوياً
8. ملاحظات أخرى.

د. خط

1. عدد الرحلات اليومية ذهاباً وإياباً لكل حافلة.
2. نسبة عدد الركاب لكل رحلة (عدد الركاب من العدد الأقصى المسموح به ونسبة مئوية) لهذا الخط يومياً
3. طول الرحلة (المسافة)
4. زمن الرحلة في ساعات الذروة
5. زمن الرحلة في ساعات الحركة البطيئة
6. التعرفه الحالية.
7. توقع سفر الحافلة بالكيلومترات سنوياً
8. ملاحظات أخرى.

14. أي ملاحظات أخرى

نموذج خطوط المركبات العمومية سرفيس

1. معدل استهلاك الوقود، كيلومتر لكل لتر (كم / لتر) _____
2. معدل استهلاك الوقود أثناء الانتظار (Netural)، دقيقة لكل لتر (دقيقة / لتر) _____
3. سعر التأمين السنوي (7 ركاب)
 - أ. جديد وتأمين شامل _____
 - ب. قديمة وفريق ثالث _____
4. رسوم الترخيص والبرميت السنوي _____
5. ضرائب سنوية لكل سيارة (أو لسائق السيارة) _____
6. معدل تكاليف الصيانة الدورية السنوية _____
7. معدل التصليحات السنوية للسيارة القديمة (أكثر من 5 سنوات) .
8. تكاليف أخرى سنوية حدد : نوعية التكلفة وقيمتها.
 1. _____
 2. _____
 3. _____
 4. _____
9. أجره السائق اليومية أو الشهرية _____
10. معدل الدخل السنوي لكل مركبة عمومية من رحلات، مناسبات، مواد دعائية .. الخ _____
11. سعر تكلفة السيارة العمومية (7 ركاب)
 - أ. المركبة الأكثر استخداما، النوع : _____ ، السعر : _____
 - ب. مركبة أخرى ، النوع _____ ، السعر : _____
 - ج. مركبة أخرى ، النوع _____ ، السعر : _____
 - د. بالمعدل السعر لكافة المركبات الجديدة _____
12. اعط امثلة لخطوط محددة
 - أ. خط _____
 1. عدد الرحلات اليومية ذهاباً واياباً _____
 2. عدد الرحلات غير الممتله (للعودة في ساعة الذروة لتحميل الركاب) _____ وعدد الركاب لكل منها [من (1) الى (6)] _____
 3. طول الرحلة (المسافة) _____
 4. زمن الرحلة في ساعة الذروة (بالدقيقة) _____
 5. زمن الرحلة في ساعات غير الذروة (بالدقيقة) _____

6. التعرفه الحالية

7. توقع سفر المركبة بالكيلومترات سنوياً _____

8. ملاحظات أخرى .

ب. خط

1. . عدد الرحلات اليومية ذهاباً وإياباً _____

2. عدد الرحلات غير الممتله (للعودة في ساعة الذروة لتحميل الركاب) _____ وعدد الركاب لكل منها

[من (1) الى (6)] _____

3. طول الرحلة (المسافة) _____

4. زمن الرحلة في ساعة الذروة (بالدقيقة) _____

5. زمن الرحلة في ساعات غير الذروة (بالدقيقة) _____

6. التعرفه الحالية

7. توقع سفر المركبة بالكيلومترات سنوياً _____

8. ملاحظات أخرى .

ج. خط

1. . عدد الرحلات اليومية ذهاباً وإياباً _____

2. عدد الرحلات غير الممتله (للعودة في ساعة الذروة لتحميل الركاب) _____ وعدد الركاب لكل

منها من (1) الى (6)] _____

3. طول الرحلة (المسافة) _____

4. زمن الرحلة في ساعة الذروة (بالدقيقة) _____

5. زمن الرحلة في ساعات غير الذروة (بالدقيقة) _____

6. التعرفه الحالية

7. توقع سفر المركبة بالكيلومترات سنوياً _____

8. ملاحظات أخرى .

د. خط

1. . عدد الرحلات اليومية ذهاباً وإياباً _____

2. عدد الرحلات غير الممتله (للعودة في ساعة الذروة لتحميل الركاب) _____ وعدد

الركاب لكل منها [من (1) الى (6)] _____

3. طول الرحلة (المسافة) _____

4. زمن الرحلة في ساعة الذروة (بالدقيقة) _____

5. زمن الرحلة في ساعات غير الذروة (بالدقيقة) _____

6. التعرفه الحالية

7. توقع سفر المركبة بالكيلومترات سنوياً _____

8. ملاحظات أخرى .

13. أي ملاحظات أخرى _____

Annex 3: Sample Template for Tariff Estimation (page 1)

1	2	3	4	5	6	7	8	9	10
الرقم المتسلسل	رقم الخط	التعرفة الحالية (بالشيكل)	المسافة (كم)	سعر الوقود (شيكل/لتر)	المعدل الموزون لاستهلاك الوقود خلال السير (كم/لتر)	المعدل الموزون لاستهلاك الوقود خلال التوقف (دقيقة/لتر)	المعدل الموزون لزمن التوقف خلال الرحلة (دقيقة)	المعدل الموزون لتكاليف التسجيل والبرميت (شيكل/للسنة/للمركبة)	المعدل الموزون لتكاليف الضريبة (شيكل/للسنة/للمركبة)
seq. no.	route no.	current tariff (NIS)	distance (km) ¹	fuel rate (NIS/litre)	weighted average fuel consumption - in motion- (km/litre) ²	weighted average fuel consumption - idling- (min/litre) ³	average idling time per trip (min) ⁴	weighted average registration + permit (NIS/yr/veh)	weighted average taxes per year (NIS/yr/veh)
1	BZ1	3.0	12.0	5.43	4.0	60.0	7.0	950	3500
2	BZ2	4.0	12.0	5.43	8.0	90.0	6.0	3200	2740
3	BT1	2.0	6.5	5.43	4.5	60.0	4.0	950	3000
4	BT2	3.0	6.5	5.43	8.0	90.0	3.0	3200	2740
5	RN1	10.0	55.0	5.43	2.0	60.0	10.0	950	1800
6	RN2	15.0	55.0	5.43	8.0	90.0	5.0	3200	2740
7	NQ2	10.0	42.0	5.43	8.0	90.0	4.0	3200	2740
8	NT2	8.5	35.0	5.43	8.0	90.0	4.0	3200	2740
9	NA2	40.0	75.0	5.43	8.0	90.0	4.0	3200	2740
10	RJ2	32	108	5.43	8.0	90.0	6	3200	2740

Continue - Sample Template for Tariff Estimation (page 2)

11	12	13	14	15	16	17	18	19	20
المعدل الموزون لتكاليف التأمين (شيكل/للسنة/للمركبة)	المعدل الموزون لتكاليف الصيانة والتصليح (شيكل/للسنة/للمركبة)	المعدل الموزون لتكاليف أخرى (شيكل/للسنة/للمركبة)	المعدل الموزون لدخل غير التعرفة (شيكل/للسنة/للمركبة)	أجرة السائق (شكيل/اليوم)	المعدل الموزون لثمن المركبة (شيكل)	المعدل الموزون لسنوات خدمة المركبة (سنوات)	المعدل الموزون لثمن بيع المركبة بعد انتهاء سنوات الخدمة (شيكل)	نسبة الفائدة على استقراض ثمن المركبة (رقم عشري)	عدد الرحلات باتجاه واحد (رحلة/اليوم)
weighted average annual Insurance (NIS/yr/veh)	weighted average annual maintenance and repair cost (NIS/yr/veh)	other annual cost averaged per vehicle (NIS/veh/yr) ⁵	other annual income averaged per vehicle (NIS/veh) ⁶	Driver salary (NIS/day) ⁷	weighted average vehicle cost (NIS) ⁸	weighted average service life (years) ⁹	weighted average vehicle salvage value (NIS) ¹⁰	borrowing interest rate (decimal) ¹¹	number of one-way trip/day ¹²
5500	20000	10000	30000	90	190000	10	10000	0.01	7
4500	13000	5000	1000	80	165000	20	20000	0.01	22
3800	20000	10000	20000	90	160000	10	10000	0.01	10
4500	13000	5000	1000	90	165000	20	20000	0.01	22
4500	20000	10000	5000	80	230000	10	20000	0.01	4
4500	13000	5000	1000	90	165000	20	20000	0.01	4
4500	13000	5000	1000	90	165000	20	20000	0.01	6
4500	13000	5000	1000	90	165000	20	20000	0.01	6
4500	13000	5000	1000	90	165000	20	20000	0.01	2

Continue - Sample Template for Tariff Estimation (page 3)

21	22	23	24	25	26	27	28	29	30
			*	$(9+10+11+12+13+24)/21$	$(14/21)$	$15/(4*20)$	$(5/6)$	$(25+27+28)$	$(29-26)$
المعدل الموزون للمسافة التي تقطعها المركبة بالسنة (كم/السنة/للمركبة)	المعدل الموزون لسعة المركبة للركاب (مقعد/للمركبة)	المعدل الموزون لنسبة الامتلاء للمركبة (رقم عشري)	معدل قيمة استهلاك المركبة (شيكل/السنة)	التكلفة للكيلومتر للمصروفات السنوية (شيكل/كم)	مدخولات سنوية للمركبة (غير التعرفة) لكل كيلومتر (شيكل/كم)	تكلفة أجره السائق للكيلومتر (شيكل/كم)	تكلفة الوقود لكل كيلومتر (شيكل/كم)	التكلفة الكاملة للكيلومتر (شيكل/كم)	التكلفة الكاملة + الدخولات غير التعرفة للكيلومتر (شيكل/كم)
weighted average vehicle travel (km/yr) ¹³	weight average veh size (seat/veh)	weight average occupancy per vehicle (decimal)	average vehicle depreciation (NIS/yr)	cost per km for annual fixed cost (NIS/km)	other annual income per km (NIS/km)	cost per km for driver salary per day (NIS/km)	fuel cost per km (NIS/km)	total cost per km (NIS/km)	total cost and other annual income per km (NIS/km)
80000	35	0.40	19105	0.74	0.38	1.07	1.36	3.17	2.79
60000	7	0.80	8235	0.61	0.02	0.30	0.68	1.59	1.58
80000	17	0.70	15937	0.67	0.25	1.38	1.21	3.26	3.01
60000	7	1.00	8235	0.61	0.02	0.63	0.68	1.92	1.90
130000	55	0.50	22372	0.46	0.04	0.36	2.72	3.54	3.50
75000	7	0.85	8235	0.49	0.01	0.41	0.68	1.58	1.56
60000	7	0.85	8235	0.61	0.02	0.36	0.68	1.65	1.63
50000	7	0.85	8235	0.73	0.02	0.43	0.68	1.84	1.82
50000	7	0.65	8235	0.73	0.02	0.60	0.68	2.01	1.99
80000	7	0.85	8235	0.46	0.01	0.42	0.68	1.55	1.54

Continue - Sample Template for Tariff Estimation (page 4)

31	32	33	34	35	36	37	38	39	40
(8/7)*5	(30*4)+31	(22*23)	(32/33)				(34*35*36*37)		
تكلفة الوقوف في الرحلة الواحدة (شكيل/للرحلة)	تكلفة الرحلة (شكيل)	معدل الركاب لكل رحلة (راكب/للرحلة/للمركبة)	تكلفة الراكب لكل رحلة (شكيل/للراكب/للرحلة)	نسبة ربح	تعديل لوقت الخدمة (1.0 – 1.5)	تعديل للتنافس والإمكانات (0.8 – 1.2)	التعرفة المحتسبة (شكيل/للراكب/للر حلة)	إمكانية الدعم الحكومي (شكيل/للراكب /للرحلة)	التعرفة المعتمدة (شكيل/للراكب /للرحلة)
average Idling time cost per trip (NIS)	cost per trip (NIS)	average passenger per veh per trip (person/veh/trip)	average cost per passenger per trip (NIS/person/trip)	profit margin	Adjustment for service time (1.0-1.5)	competition and affordability adjustment factor (0.8-1.2)	Tariff calculations (NIS)	possible government subsidy (NIS/km)	Rounding and final decision of MOT (NIS)
0.63	34.14	14.00	2.4	1.2	1	1	2.93		
0.36	19.28	5.60	3.4	1.2	1	1	4.13		
0.36	19.94	11.90	1.7	1.2	1	1	2.01		
0.18	12.55	7.00	1.8	1.2	1	1	2.15		
0.91	193.34	27.50	7.0	1.2	1	1	8.44		
0.30	86.29	5.95	14.5	1.2	1	1	17.40		
0.24	68.72	5.95	11.5	1.2	1	1	13.86		
0.24	63.97	5.95	10.8	1.2	1	1	12.90		
0.24	149.66	4.55	32.9	1.2	1	1	39.47		
0.36	166.83	5.95	28.0	1.2	1	1	33.65		

Continue - Sample Template for Tariff Estimation – **Footnotes** (page 5)

1: route and destination have been changed due to the Israeli closure; actually route length are required and periodic verifications are needed

2: weighted average per vehicle type; the weight average is calculated (and weight average are calculated wherever this term appears in the same manner) by multiplying the consumption rate for each vehicle type by the number of vehicles in such vehicle type; then the product is divided by the total number of vehicles in all types (the type in this case refers generally to vehicle size, which correlates with fuel consumption)

3: This is a weighted average per vehicle type for the consumption of fuel while the vehicle is idling

4: The weighted average idling time for all trips per day (peak and off-peak), it includes waiting at signals and in congestion queues as well as waiting at check points.

5: such as administration cost, passenger service cost, etc.

6: such as income from field trips, special events, and advertisements on vehicles

7: estimated for 8 hours per day and 6 days per week of work (the daily work for transit usually spans for 10 hours with two hours of breaks); thus service in access of 10 hours would required additional part-time drivers or overtime pay.

8: care is needed for purchase of used vehicle and for vehicle operating beyond the service life; in the later case the cost of vehicle for the extra period beyond the service life would be zero

9: care is needed for used vehicle and for vehicles operating beyond their service life; there will be either extension of service life or assuming that vehicle cost beyond service life is zero

10: the salvage value or vehicle price at the end of the service life, must also be considered carefully, for the case of extension of the service life this values would be lowered

11: the rate is usually for part of purchase price of the vehicle and most likely for lower period than the service life; but since the vehicle purchase price is used and the service life, then the interest rate must be lowered to reflect these variables (**important note: you can input an interest rate of 0; use instead 0.000001**)

12: need to be obtained from periodic field surveys for the various routes

13: The yearly average of distance travelled per vehicle includes distance travelled while not operating on the route; it could be obtained from the kilometers counter on each vehicle during the annual or bi-annual inspection of the vehicle for registration

$$* (16) CR = \frac{i(1+i)^n}{(1+i)^n - 1} \quad - \quad (19) USSF = \frac{i}{(1+i)^n - 1}$$