

Characterization of the "Público" System of Puerto Rico

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The "público" system of Puerto Rico is a privately operated government-regulated transportation service to the general public ranging from small urban routes to long intercity routes. This service is normally operated on fixed routes and fixed fares with low-capacity automobiles and passenger vans. The principal objective of this paper is to present a summary of a recent study that provided a description of the "público" system as it operates in Puerto Rico. Data for the study were obtained from previous "público" system studies and from government agencies that regulate the system. The paper presents for the "público" system its general and specific characteristics and qualitative attributes and discusses its advantages and limitations.

The inability to solve urban transportation problems, despite the infusion of billions of dollars in public subsidies during the past two decades, demonstrates the need for private-sector participation in urban and rural transportation systems and experimentation with innovative forms of transportation investments. Researchers and transportation planners have recognized that an ideal urban transportation system is a cooperative mix of paratransit and conventional transit with highly coordinated and varied ownership and with active involvement of private paratransit providers in planning and operation of the service (1).

A paratransit system, locally known as "públicos," has been successfully operating in Puerto Rico for several decades. This paper summarizes a study that provided a description of the "público" system as it operates in Puerto Rico (2).

STUDY ORGANIZATION

Because the principal objective of the study was to present a complete description of the "público" system, considerable data on its general and specific characteristics were gathered from previous studies and from government agencies that regulate the system (3-14). These studies have been performed throughout Puerto Rico to evaluate potential sites for "público" terminals, consider the effect of these terminals on the transportation system, and recommend public policies regarding the "público" system. Based on the availability of these studies, four municipalities, Bayamón, Arecibo, Mayagüez, and Aguadilla (see Figure 1), were selected to analyze the "público" system. These municipalities represent different types of conditions and thus different operating characteristics for their respective "público" systems. In each municipality

a data base that integrated "público" service characteristics and socioeconomic information was constructed to obtain specific characteristics of the system.

This paper also presents general characteristics of the "público" system and qualitative information on several attributes mostly related to the level of service provided, and it discusses the system's advantages and limitations.

"PÚBLICO" SYSTEM—GENERAL CHARACTERISTICS

Historical Review

The "público" operation in Puerto Rico dates back to the beginning of this century. However, little information is available before the 1970s. An intercity public transportation study performed in 1972 recommended development of intermodal terminal facilities to consolidate "público" operations and increase system efficiency and attractiveness (4). This recommendation has had a major impact on the operation of the "público" system. Several terminals have been built throughout the island and several others are being planned. Recent studies in various cities including Río Piedras, Bayamón, Arecibo, and Aguadilla mainly have been emphasizing the planning and evaluation for potential sites for the terminal facilities (5-9).

In 1980, an evaluation was made of a demonstration trunk and feeder system in which the "públicos" served as feeder to several bus routes in portions of the San Juan Metropolitan Area (SJMA) (10). The main conclusion of the study was that the experiment had failed primarily because of a lack of coordination between the "público" feeders and the trunk bus routes.

During 1983, the Transportation Institute of the University of Puerto Rico performed an evaluation of the impact of a "público" terminal facility on the Mayagüez urban area and its transportation system (11). In the study, it was determined that the new centralized terminal facility contributed significantly to improve the "público" system and the central business district (CBD). The new facility increased conveniences to users and operators, facilitated transfers between routes, provided protection from weather, provided security for drivers and users, and eliminated parking from the CBD.

A policy study dealing with public transit alternatives was completed in 1985 in which the role of the "público" system was analyzed with respect to the current and future transit needs in the SJMA (12). The main conclusions of that study were that the "público" system is an effective transit mode

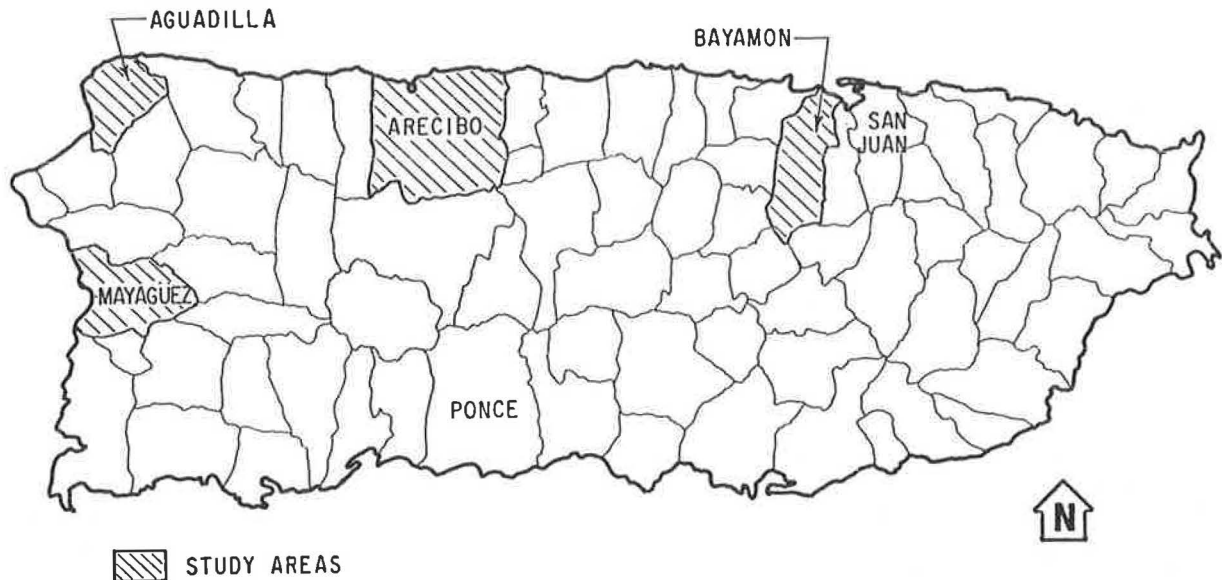


FIGURE 1 Location of study areas.

alternative and emphasis should be placed on its continued development; “públicos” should be given priority in those low-to-medium-density urban and rural sectors where the “público” service is the principal mode of transit travel; and “públicos” should be allowed to operate in high-density areas only if they form a beneficial complementary service or where there is sufficient demand for two or more modes of public transit.

Operating Characteristics

The “público” system provides a family of services to the general public (see Table 1) with different operating characteristics. Islandwide there are approximately 12,000 vehicles distributed over about 900 routes, which serve both urban and rural areas. The operators determine the hours of operation mainly based on the availability of passengers, but other factors such as the type of route, the type of route organization, distance traveled, and vehicles available also influence the number of hours of operation. Other decisions regarding the service such as the route alignments, fares, operators’ licensing, vehicle requirements, and locations of terminal facilities are regulated by different government agencies.

In terms of service characteristics the “público” service is normally provided from Monday through Friday from 6:00 a.m. to 6:00 p.m. and Saturdays from 6:00 a.m. to 5:00 p.m. There is hardly any service at night or on Sundays. Outside the operating hours, the “público” vehicles are often used as personal vehicles by the operators.

Regulatory Controls

The “público” system is regulated by the Public Service Commission (PSC), the Department of Transportation and Public Works (DTPW), and the municipal governments. The PSC controls entry into service, licensing, transfers, suspensions,

fares, and other issues. The operators are regulated through the licensing procedure. A 5-year renewable authorization to operate a specific route is provided only after the operator meets licensing requirements (age, good conduct, medical certificate, driver training, and so on), a needs and convenience study of the route for which the candidate is soliciting is conducted, and public hearings are held. Once licensed, the PSC can impose sanctions for route violations, such as invading another route, discipline, unsafe vehicles, illegal fares, and so on.

Fares are determined by the PSC through similar procedures as for licensing and route establishment. New fares or modifications to existing fares are established after special fare studies are conducted. These studies consider the route

TABLE 1 SERVICES PROVIDED BY THE “PÚBLICOS”

Type of Service	Characteristic
1. Local Routes	Unscheduled municipal level coverage connecting town center to residential areas, office complexes, commercial areas, schools and suburbs or barrios. General fares range from \$0.50 to \$1.00.
2. Intercity Routes	Unscheduled service along primary state highways between municipalities and some deviation from routes to serve major communities or institutions. Fares range from \$1.00 to \$5.00.
3. “Lineas” (Line Service)	Scheduled door to door service between major cities with phone reservations. Also package delivery. Typical fares \$3.00 to \$10.00.
4. “Urbano” (Urban Routes)	Special service in Mayagüez area with and without door to door service within city limits with no fixed routes or fixed stops. General fares \$0.50 to \$1.00.

operating costs plus its supply and demand patterns. The PSC also regulates the vehicles by establishing minimum and maximum vehicle and safety requirements.

The DTPW regulates operator licensing, vehicle registration, terminals and stops within the right-of-way of state roads, and traffic control on state roads. The municipal governments regulate the location and design of curb-side and off-street terminals and stops along the right-of-way of municipal roads and control traffic operations along municipal roadways.

Vehicle Types

The vehicles used for "público" service include sedans, checkers, vans, and minibuses. Sedans, which constitute about half of the "público" system fleet, have a seating capacity of five or six passengers and are the preferred vehicle type in areas in which the passenger demand is not sufficient to justify larger vehicles. Vans, which have capacities that vary from 14 to 17 passengers, are being used in high-demand intercity and local routes. The minibus has a capacity of 17 passengers and is more comfortable than the regular vans, but because of its high price its use has been limited. The operators do not receive any direct subsidies for the purchase of their vehicles but do obtain excise tax exemptions and low-interest loans through a government agency.

Organization of "Público" Operators

The operators can either work independently or join to form route associations or cooperatives. Route associations are organizations of operators who serve the same area and want to centralize their operations to function as a unit. They share a common place at the terminal, rotate service between vehicles, and buy parts and tires wholesale to save on operating expenses. These route associations tend to improve the service because controls can be implemented regarding minimum headways, passenger quotas, and route distributions by sectors.

Cooperatives are more formal arrangements usually made up of various route associations. They are often used to create benefit programs for the operators, such as low-interest loans, and are active in lobbying with governmental agencies and commercial concerns to obtain special rates from gasoline stations, automobile parts stores, and other related establishments.

Governmental Support and Incentives

Although the "público" operators do not receive any direct governmental subsidies, either local or federal, the government does provide several supportive actions and incentives. These incentives include lower vehicle registration fees, excise tax exemption on the purchase of vehicles, low-interest loans, and terminal facilities. "Público" operators who own and operate their vehicles as their sole source of income pay only a \$1 annual vehicle registration fee (Puerto Rico's current fee is \$40) and are allowed full excise tax exemption on the purchase of vehicles.

"Público" operators can also obtain a franchise certificate through the PSC and then use it as collateral for low-interest loans obtained through the Commercial Development Corporation (a government agency). The loans can be used toward the purchase of a new vehicle or for the repair of an existing unit.

The provision of terminal facilities is the most significant form of aid provided by the government. Municipal governments have taken advantage of several programs under the Urban Mass Transportation Administration to obtain funding for the planning, design, and construction of major off-street terminal facilities. These terminals have provided better facilities for operators and users and have contributed to improving traffic and parking conditions near the towns' plazas.

"Público" Users

Information on the characteristics of the "público" users was obtained from various surveys conducted in earlier studies. Table 2 summarizes the occupations of different groups of "público" users. The table indicates that students and housewives represent a significant portion of the "público" users.

The average family income of "público" users is difficult to obtain since many are not willing to answer and the various surveys use different ranges for the income. Of those willing to answer, approximately 38 percent indicated an income of less than \$3,600/year, approximately 38 percent between \$3,600 and \$7,200, and 24 percent indicated greater than \$7,200.

The majority of "público" users can be considered as captive to the system because, in all the studies, from 75 to 90 percent of the users indicated that the reason for using the system was that they did not have other alternatives.

The trip purpose of users is fairly evenly divided between work, school, shopping, visits to government agencies and medical services, and personal trips.

TABLE 2 OCCUPATIONS OF "PÚBLICO" USERS

	Aguadilla	Arecibo	Bayamón	Mayagüez	SJMA
Student	46.20	26.60	52.10	34.60	27.80
Employees	18.10	19.60	18.30	23.90	35.60
Housewife	20.20	29.00	18.70	21.70	18.10
Unemployed	7.10	13.40	5.30	9.10	9.50
Other	8.40	11.40	5.70	10.70	9.30

Averages from various surveys in earlier studies

“PÚBLICO” SYSTEM—SPECIFIC CHARACTERISTICS

This section complements the general “público” information provided earlier with a detailed description of the level of service and socioeconomic characteristics of the population served in the four study areas (Aguadilla, Arecibo, Bayamón, and Mayagüez).

Demographic Characteristics

According to the 1980 Bureau of Census statistics (14–18), Puerto Rico has a population density of 361 persons per square kilometer. The population is distributed mostly in urban areas (urban/rural ratio is approximately 2 to 1). The demographic characteristics of the four study areas are shown in Table 3.

Bayamón represents a densely populated urban area, which is part of a major metropolitan area, with extensive development (commercial, industrial, and residential) and in which the “público” system provides the majority of transit trips to the urban residential developments and wards.

Arecibo represents a regional center with a considerable rural population and which has an extensive “público” system providing service within the urban area, regional intercity coverage, and service to a large number of rural wards.

Mayagüez serves as the regional center for trade, commerce, industry, and public health and is also an important educational center. Mayagüez has a balanced combination of urban, suburban, and rural wards. It has a fairly extensive “público” system that ranges from urban service (called the “urbano,” which operates as a shared taxi within the urban area) to a door-to-door service to the capital city of San Juan.

Aguadilla, located less than 20 mi to the north of Mayagüez, is a small regional center, within the area of influence of the

Mayagüez region. It represents a small regional center with a well-developed “público” system that provides service within the urban area, regional intercity coverage, and door-to-door service to San Juan.

Table 3 also indicates several aspects related to commuting to work and the use of public transportation in the four study areas. The majority of workers use their private vehicles to travel to work, drive alone, and have a mean travel time to work of less than 25 min. In all of the municipalities the percentage of workers using public transportation (bus and “públicos”) to work was less than 20 percent, and the “público” system constitutes the principal means of public transportation.

Route and Vehicle Information

As shown earlier in Table 1, the “público” system has three basic types of routes: local, intercity, and line service. Besides the three basic route types, in Mayagüez there is an “urbano” route that provides door-to-door service within the city limits but does not have terminals, fixed routes, or fixed stops.

In the United States, “públicos” are often described as a jitney system, which is not entirely correct. “Públicos” provide a wide range of service types, including the one similar to jitneys provided by the local system, the door-to-door scheduled service of the line system, and the shared-ride taxi system represented by the Mayagüez “urbanos.” The fundamental characteristic of the “públicos” is the institutional arrangement that includes the government incentives and regulations, the route associations, and the high percentage of owner operators with significant flexibility in the way they operate their businesses.

In terms of vehicle types, sedans and vans are the vehicles used most in the four study areas. but the vehicle mix varies

TABLE 3 DEMOGRAPHIC INFORMATION FOR THE STUDY AREAS

	Puerto Rico	Aguadilla	Arecibo	Bayamón	Mayagüez
1. Population (1980)	3,196,520	54,606	86,766	196,206	96,193
2. Area (sq. km.)	8,855	95	330	116	200
3. Pop. Density (persons/sq. km.)	361.00	574.80	262.90	1691.40	481.00
4. Urban Population	2,134,365	48,613	52,457	189,753	85,714
5. Urban/Rural Ratio	67/33	89/11	60/40	97/3	89/11
6. Percent of Total Population enrolled in school	30.40	28.30	29.10	32.70	31.00
7. % Unemployed	15.20	22.30	17.10	11.50	14.90
8. Mean Income per Household (\$)	7,738	6,406	6,532	9,769	7,946
9. Means of Transportation to Work (%)					
a) Private Vehicle	68.3	64.90	68.50	77.20	65.70
b) Bus	4.5	0.80	1.20	2.80	0.60
c) "Públicos"	12.4	18.10	16.40	11.60	14.60
10. Travel Time to Work -Mean (minutes)	25.8	18.90	23.50	29.70	19.50

TABLE 4 ROUTE DISTRIBUTION AND NUMBER OF VEHICLES FOR EACH TYPE OF ROUTE FOR THE STUDY AREAS

	Total	Intercity	Local	Line	"Urbano"
Arecibo					
# of routes	45	14	29	2	---
# of vehicles	778	224	450	104	---
Aguadilla					
# of routes	15	8	5	2	---
# of vehicles	513	256	222	35	---
Bayamón					
# of routes	36	15	21	---	---
# of vehicles	1,068	529	539	---	---
Mayagüez					
# of routes	24	12	10	1	1
# of vehicles	642	246	118	20	258

from area to area. The tendency has been to replace sedans with higher capacity vehicles in those routes that have a higher passenger demand. Table 4 shows the distribution of routes and the number of vehicles for each type of route in each of the study areas. In all the study areas, the "público" system is fairly extensive, with more than 500 vehicles providing good local and intercity coverage.

To provide a better idea of the magnitude of the "público" service in each of the study areas, four commonly used statistics were computed and are presented in Table 5. In all of the study areas there are at least 20 authorized vehicles per 1,000 households and at least an average of 17 vehicles per route. Aguadilla, although the smallest of the study areas in terms of the size of the municipality, has the highest rate of authorized vehicles per household, per person, and per route. This may reflect a problem of oversupply, which was indicated in a recent study (9). Bayamón, being the most densely populated of the study areas, has the lowest rate of authorized vehicles per household and per person, but it has the highest rate per square kilometer. Arecibo, being the largest of the municipalities in terms of size, has high rates per household and per person but the lowest rates per square kilometer and per route.

The study areas are also served by other modes of public transportation. Arecibo is served by four private bus companies that have 13 buses distributed over six routes connecting to nearby municipalities and to the eastern rural communities. In Bayamón there are also eight private bus routes with approximately 33 buses that use Bayamón as a stopover and provide regional intercity service. It is also served by five routes of the Metropolitan Bus Authority. Aguadilla and Mayagüez had, until recently, a very limited bus service to San Juan. Taxi service is also available in all the study areas but only to a minor degree.

Passenger and Revenue Data

The passenger and revenue data for the four study areas are summarized in Tables 6 through 9. The information about passengers and vehicle trips was based on cordon counts conducted between 6:00 a.m. and 6:00 p.m., on a typical weekday, and information about weekends and night service was not included. Also, because of the lack of information about trips starting outside of the cordon line, certain correction

factors, based on interviews with the operators and spot checks along the routes (20), had to be applied.

Revenue was computed based on the official fare of the route and the estimation of the cost of providing "público" service. The principal source of data for this purpose is the PSC. The cost estimates developed by the PSC consist of two components, one fixed, the other variable. The fixed costs of the PSC's methodology include depreciation, tires, repairs, maintenance, insurance, and registration. The total fixed costs per vehicle per day vary from \$15.38 for a six-passenger vehicle to \$27.68 for a 20-passenger van. The variable cost component includes fuel cost per mile based on average fuel efficiency ratings for the fleet by vehicle type. The efficiency ratings used are 13 mi/gallon for the six-passenger sedans, 10 mi/gallon for 12-to-15 passenger vans, and 8 mi/gallon for the 17-to-22 passenger minibuses. These ratings, together with the fleet composition by route and the average fuel cost (assumed \$1.39/gallon), are used to obtain the fuel cost by route.

The PSC cost methodology does not include labor costs. The reason for this is that the principal labor cost of the "público" system is that of the driver and, because a large percentage of the drivers are vehicle owners, a salary per se was not considered appropriate. Thus, the net revenue obtained from the gross revenue and cost estimates based on this methodology include the income of the driver.

The information in Tables 6 through 9 can be used to compare the "público" systems of the study areas and the different types of routes. While comparing, one should remember that the four study areas represent different types of environments. Bayamón has the "público" system with the most vehicle trips and passenger trips. In addition, its system has the shortest headways, the highest vehicle occupancy, and the highest rev-

TABLE 5 STATISTICS ON AUTHORIZED "PÚBLICO" VEHICLES

	Veh./1,000h.h.	Veh./1000pop.	Veh./sq.km.	Veh./Route
Arecibo	31.63	8.97	2.36	17.29
Aguadilla	33.34	9.39	5.35	34.20
Bayamón	20.60	5.44	9.16	29.67
Mayagüez	23.05	6.67	3.22	26.75

TABLE 6 AGUADILLA "PÚBLICO" SYSTEMWIDE INFORMATION

Variable Name	Total	Intercity	Local	"Línea"
Vehicle Trips Per Day	1,715	663	1,025	27
Passenger trips per day (outbound-thru cordon)	5,952	2,223	3,647	82
Passenger trips per day (total trip adjusted)	18,271	6,652	11,349	270
Headways (minutes)	0.42	1.09	0.70	26.67
Two-way route length (km)	812.60	211.20	97.40	504.00
Average Occupancy (One-way trip adjusted)	5.33	5.02	5.54	5.00
Round trips/veh.	4.14	3.27	5.57	1.00
Revenue per day (\$)	15,775	5,800	8,355	1,620
Revenue/veh. per day (\$)	38.10	28.57	45.41	60.00
Cost/veh. per day (\$)	20.24	18.31	20.79	30.98
Profit/veh. per day (\$)	17.86	10.26	24.62	29.02
Fare/km (cents)	5.35	5.97	7.08	4.76
Revenue/km (\$)	0.40	0.32	0.58	0.24
Cost/km (\$)	0.21	0.20	0.27	0.12
Profit/km (\$)	0.19	0.12	0.31	0.12

"Público" data based on a study performed in 1984

venues and profits per vehicle. But even in Bayamón, the average revenues and profits per vehicle are relatively low. The Arecibo system also has a significant number of vehicle trips and passenger trips per day and has similar economic characteristics as the Aguadilla "público" system. Both of these systems have less revenues and lower profits than the Bayamón system. The Mayagüez system shows the least vehicle trips and passenger trips per day, longer headways, and lower revenues and profits. A variable that is fairly consistent in all of the study areas is the fare per kilometer, being an average of 5 to 6 cents in all of the systems.

A comparison between the different types of "público" routes indicates that the local routes are characterized by more passenger trips per day and higher vehicle occupancy, more frequent service, more trips per vehicle, shorter headways, higher revenues, and higher profits. The line service is characterized by a fewer number of trips, longer trips, longer headways, and higher revenues and profits per vehicle but low profits per kilometer.

"PÚBLICO" SYSTEM—QUALITATIVE INFORMATION

Several attributes, mostly related to the level of service provided by the "público" system for which lack of data prevented numerical comparisons, are discussed in a qualitative manner. These attributes include privacy and general comfort, average speed and directness of travel, waiting time,

service coverage, safety and insurance, and organizational and labor issues.

Privacy and General Comfort

The "público" vehicles are, on the average, 6-year-old sedans, and, given their high occupancy, the privacy and comfort provided are low.

Average Speed and Directness of Travel

The average speed and directness of travel of "públicos" are highly dependent on the type of route. In the case of the intercity "públicos," which operate between terminals at the towns' plazas, the alignment is usually that followed by private automobiles in similar journeys. For this reason, the in-vehicle travel time of this service is similar to that of private automobiles.

The journey of the line service can be divided into three separate components: collection, distribution, and linehaul. The linehaul segment of this service operates similarly to the other intercity "públicos" with travel time almost equal to that of private automobiles. The collection and distribution legs of this service are along residential streets with low speeds.

Local "público" routes operate along major arteries and roads with lower average speeds because of the frequent stops they make along the route to pick up and deliver passengers.

TABLE 7 ARECIBO "PÚBLICO" SYSTEMWIDE INFORMATION

Variable Name	Total	Intercity	Local
Vehicle trips per day	2,119	366	1,753
Passenger trips per day (outbound-thru cordon)	9,391	1,053	8,338
Passenger trips per day (total trip adjusted)	29,962	3,776	2,618
Headways (minutes)	0.34	1.97	0.41
Two-way route length (km)	1018.7	265.8	752.9
Average Occupancy (One-way trip adjusted)	7.07	5.16	7.47
Round trips/veh.	4.38	2.70	4.97
Revenue per day (\$)	19,628	4,230	15,398
Revenue/veh. per day (\$)	40.55	32.29	43.62
Cost/veh. per day (\$)	22.15	20.62	22.72
Profit/veh. per day (\$)	18.4	11.6	20.9
Fare/km (cents)	5.02	6.09	4.65
Revenue/km (\$)	0.36	0.27	0.39
Cost/km (\$)	0.19	0.17	0.21
Profit/km (\$)	0.17	0.10	0.18

"Público" data based on a study performed in 1983.

Waiting Time

The frequencies of local "públicos" are determined dynamically by the demand of travel; for this reason, although they provide frequent service, they can be highly unreliable, particularly at periods of low demand. Many intercity "público" routes also set their frequencies dynamically in response to the demand. In this case, the service is less frequent and its variability can be quite high because of the lower demand rates.

For both the local and intercity "públicos," there is a large variation in the route headways within a route type. For example, in Aguadilla, the average route headway of intercity routes was 17.65 min, but it ranged from 3.2 to 65.5 min. The routes serving rural areas have longer headways because their demand rates may be relatively low. Line service, on the other hand, provides reliable door-to-door service but with less frequency. The latter does not affect the wait time because passengers adapt their trips to this schedule; however, this may be inconvenient if travel is required at specific times of day.

Service Coverage

The service coverage of a system refers to its availability to offer service to different origins and destinations (spatial component), at different times of day (temporal component), and the ability to complete the trip in as short a time as feasible. In terms of the spatial and temporal coverage, the private

automobile or a taxi can be considered the best mode. The different components of the "público" system can be considered at a second level in terms of spatial coverage because they are dense regional systems.

"Públicos" are also usually available for emergency trips in their neighborhoods and for special trips during nonworking hours to airports, sporting events, or political activities. This adds to the temporal coverage of this mode, providing much-needed service for the transit dependent.

Safety and Insurance

The accident records in Puerto Rico do not categorize "público" accidents and, thus, there is no published information. "Públicos," however, are not considered a safety hazard for passengers, but many drivers create traffic problems because they frequently stop at any point, for passenger pickup and delivery, without regard to the rest of the driving population.

Organizational and Labor Issues

The "público" system is not well organized, and a loose organizational structure exists only at the route level, mostly to ensure vehicle loading priorities at the terminals and to take phone calls for the line service. The drivers are free with respect to schedules and operation of vehicles. All this leads to inefficient operations and affects reliability of service. The

TABLE 8 BAYAMÓN "PÚBLICO" SYSTEMWIDE INFORMATION

Variable Name	Total	Intercity	Local
Vehicle trips per day	3,586	1,106	2,480
Passenger trips per day (outbound-thru cordon)	33,165	9,680	23,485
Passenger trips per day (total trip adjusted)	95,165	28,756	66,409
Headways (minutes)	0.20	0.65	0.29
Two-way route length (km)	1266.56	790.88	475.68
Average Occupancy (One-way trip adjusted)	13.27	13.00	13.39
Round trips/veh.	4.16	2.70	5.47
Revenue per day (\$)	51,112	20,930	30,182
Revenue/veh. per day (\$)	59.23	51.05	66.63
Cost/veh. per day (\$)	25.42	24.32	26.41
Profit/veh. per day (\$)	33.81	26.73	40.22
Fare/km (cents)	4.67	4.68	4.67
Revenue/km (\$)	0.60	0.57	0.63
Cost/km (\$)	0.26	0.27	0.25
Profit/km (\$)	0.34	0.30	0.38

"Público" data based on a study performed in 1982.

TABLE 9 MAYAGÜEZ "PÚBLICO" SYSTEMWIDE INFORMATION

Variable Name	Total	Total (without "Urbano")	Intercity	Local	"Línea"	"Urbano"
Vehicle trips per day	3,760	418	182	224	12	3,342
Passenger trips per day (outbound-thru cordon)	6,233	1,459	540	859	60	4,774
Passenger trips per day (total trip adjusted)	*	4,194	1,820	2,254	120	*
Headways (minutes)	0.19	1.72	3.96	3.21	60.00	0.22
Two-way route length (km)	*	975.80	337.10	325.10	313.60	*
Average Occupancy (One-way trip adjusted)	*	5.02	5.00	5.03	5.00	*
Round trips/veh.	8.02	1.98	1.60	2.64	1.00	12.95
Revenue per day (\$)	*	5,943	2,384	2,600	960	*
Revenue/veh. per day (\$)	*	28.16	20.93	30.58	80.00	*
Cost/veh. per day (\$)	*	18.25	16.61	17.97	35.80	*
Profit/veh. per day (\$)	*	9.91	4.32	12.61	44.20	*
Fare/km (cents)	*	5.91	5.75	6.86	5.10	*
Revenue/km (\$)	*	0.32	0.31	0.36	0.26	*
Cost/km (\$)	*	0.21	0.24	0.21	0.11	*
Profit/km (\$)	*	0.11	0.07	0.15	0.15	*

*"Público" data based on a study performed in 1983.

* Data not available.

only advantage is that overhead costs of operation are minimized. Controls exist only with respect to fares and licensing to operate on a route. Labor problems are practically nonexistent because of the individual private operations. No major conflicts are reported between the "público" system and other modes, such as taxis and public transit.

ADVANTAGES AND LIMITATIONS

The "público" system, as mentioned earlier, is the principal mode of public transportation in Puerto Rico providing a family of transportation services in urban, suburban, and rural areas. Certain socioeconomic characteristics of Puerto Rico help create an environment, in terms of both supply and demand, under which "públicos" result in an adequate transportation mode. These include the high level of unemployment, the relatively low income of the population, and the high percentage of households without phones or vehicles. These phenomena result in both a large captive "público" market and a large pool of potential operators willing to offer service at relatively low profit margins. In addition, in Puerto Rico both private and public investments in public transportation have been limited, so the "públicos" serve a useful function for school, shopping, and other types of trips.

Other significant aspects of the system are that it is self-supporting, operating without any direct government subsi-

dies and with a minimum amount of government interference. It has low startup and overhead costs because of its simple organization but contributes to the economic sector by providing a source of self-employment to a largely uneducated, unskilled middle-age labor force and by generating economic activity in local markets. It is adaptable to narrow and crowded streets where large buses cannot operate easily.

However, Puerto Rico's "público" system has its share of problems that affect the operation. These include an oversupply of vehicles in some routes, inefficient or inadequately served routes, difficulty in transfers resulting in inadequate cross-town service, slow response to changes in passenger preferences or travel patterns, limited service during periods of low demand, low operator incomes, absence of planning and scheduling information, and absence of proper insurance for both drivers and passengers.

CONCLUSIONS

The "público" system provides an acceptable and widely used service for a mostly captive market in Puerto Rico. The success is mainly because of the acceptance of low profit levels by the operators. Although other areas may have different environments compared to Puerto Rico, many of the principal characteristics of the "público" system could be used as a basis for consideration in transportation improvements by

diverse federal, state, and local transit authorities. A service based on the characteristics of the "público" system may be suitable for feeder routes to major transportation systems or as the principal mode of service in low-density and low-income areas.

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