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## Rural Passenger Transportation in the Netherlands

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The close relation in the Netherlands between rural passenger transportation, national transportation policy, and rural development objectives is described. Although Dutch cities are geographically close to one another, they remain physically separated by rural countryside as a result of strict land use control. More than one-third of the total population lives in rural areas or small towns. A high level of demand for intercity trips gives rise to high frequency and capacity of service for rural passenger travel, by both train and bus. The nationwide regional bus network is more extensive than the rail system and trip lengths are shorter. Official Dutch transportation policy seeks to maintain the distinction between intercity rail service for lengthy trips and regional bus service for rural trips and for travel on small urban transit systems. In developing new transportation facilities, including highway construction, the national plan for transportation seeks to restrain further migration of city dwellers to rural communities. For the convenience of existing rural transit travelers, central government policy is designed to relate frequency of bus service to observed levels of passenger demand. Alongside the Dutch policy of extensive national transportation service has been a recognition that traffic and transportation are essential elements in regional development planning. Improved passenger transportation in rural areas has helped to preserve the rural way of life by affording access to important urban jobs and services. The lesson of the Dutch experience is that rural transportation is most effective when integrated with national transportation policy and linked to clear objectives for rural area development.

The lesson of the Netherlands experience with rural passenger transportation lies in the close relation between Dutch rural transportation, national transportation policy, and rural development policies and not so much in the specific characteristics of Dutch transit operations and finance, which may not be widely replicable abroad. The purpose of this paper is to describe how rural transportation in the Netherlands is integrally tied to the national transportation system.

Before proceeding, it is important to highlight the major characteristics of the Dutch passenger transportation network. A railway system provides the structural skeleton for national transportation service, and a high-density regional bus network fills the spaces of the railroad grid. The Netherlands National Railway links the country's principal towns and cities. Regional bus routes accommodate the mobility needs of rural passengers, providing access to nearby town centers and to the railroad stations that serve larger, more distant cities. Within towns, the regional bus systems also provide local transit, thereby serving a dual function.

The density of the Dutch regional bus network is far greater than that familiar in the United States, averaging 5 km of bus route per 10 km<sup>2</sup> of nationwide area (3 miles/4 miles<sup>2</sup>). Moreover, a high level of demand for intercity trips in the Netherlands permits a high frequency of service by both train and bus. From many towns, there are train departures every half-hour or less. Intercity buses

are typically operated on hourly headways, although half-hour and 15-min frequencies prevail on routes used most heavily. To enhance passenger convenience, bus arrivals and departures are scheduled to coincide closely with local train schedules as well as with hours of employment and schools that provide substantial patronage for rural transit.

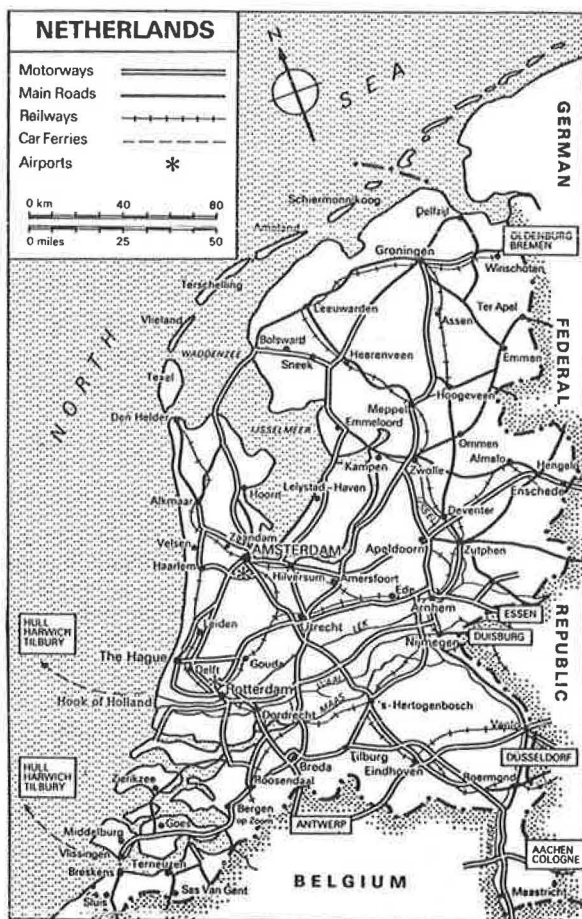
Finally, in terms of physical components of the Netherlands regional transportation system, most intercity buses are conventional 40-ft-long vehicles furnished with seats for 45 passengers. Articulated buses, with a passenger capacity of 75, are used on more densely traveled routes, and 12-passenger buses are deployed on some lightly used routes. A few experimental demand-responsive services are provided in locations where use is inadequate for conventional fixed-route operations.

### DEMOGRAPHIC ORIENTATION

The Netherlands is the most densely populated country in Europe: Its 14 million population, about one-tenth greater than that of Pennsylvania, lives on a land area less than one-third the size of that state (1). Yet even within so small a country, population density varies widely. Almost half of the people live in three western provinces: Utrecht and north and south Holland. Most of the population that resides in these three crowded provinces lives in an urban complex known as Randstad, a ring-shaped conurbation that embraces the nation's four largest cities: Amsterdam, Rotterdam, the Hague, and Utrecht. Figure 1 shows the distribution of population centers in the Netherlands. In addition to the large cities, approximately 5 million people, or more than one-third of the total, live in rural areas or small towns that have less than 20 000 population. Thus, despite the high level of urbanization in the Netherlands, a large population resides in small urban and rural areas and constitutes a significant potential market for public transportation.

Though Dutch cities are geographically close to one another, they remain physically separated by rural countryside as a result of strict land use control. This gives rise to an excellent nationwide system of interurban rail and rural bus lines. The networks make possible easy access to town services by rural inhabitants as well as business trips between towns. The transportation system that serves the Randstad, its rural separations, and surrounding regions is basically a ring-shaped set of high-speed rail lines and high-frequency bus

Figure 1. Major cities and transportation infrastructure of the Netherlands.



routes around the circumference of the conurbation, as shown in Figure 2. The degree of high-frequency bus service reflects the extent of passenger travel in this ring-shaped conurbation in western Holland.

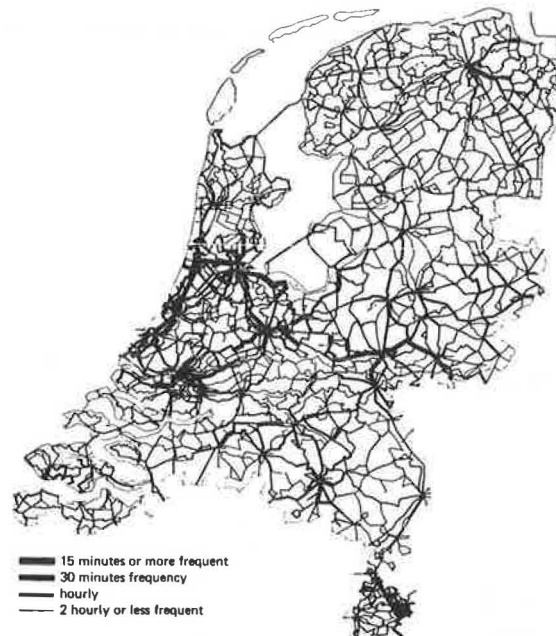
#### RURAL TRANSPORTATION OPERATIONS AND ORGANIZATION

Thirty-eight regional bus companies licensed by monopoly franchise awards provide service throughout the Netherlands, as shown in Figure 3. Thirteen of the regional operators are subsidiaries of the National Railway, 8 are provincial government undertakings--some partly controlled by the railways--and the other 17 are private enterprises. Involvement of the railroad in ownership and management of several rural bus companies has ensured correspondence between bus and train schedules as well as complementary routing between bus and train services (2).

According to the National Railway, 46 percent of the country's population live within easy reach of a railroad station (via local transit without transfers). The remaining 54 percent, or 7.6 million people, depend on bus service for intercity transportation and for local transportation within their region. This second group comprises 710 municipalities out of 841 total municipalities nationwide. Indeed, very few Dutch towns are inaccessible by either train or bus.

Table 1 gives comparative annual operating characteristics of railroad and regional bus companies in the Netherlands. From this table, two observations are significant: (a) The regional bus network

Figure 2. Regional bus service.



is more extensive than the rail system--i.e., it has greater route length, fleet size, and vehicle operation--and (b) the average trip length is greater for journeys by rail than by bus so that, even though more passengers travel by bus, more passenger kilometers are traveled by train (3). These observations are consistent with the use of rural buses for local and regional distribution and with the function of railroads as intercity carriers. Official Dutch transportation policy seeks to maintain the distinction between intercity rail service for lengthy trips and complementary regional bus service for rural trips and short intralocal trips, thereby assuring the preservation of this bimodal nationwide system.

#### INTERRELATION OF URBAN AND RURAL TRANSPORTATION

Only nine municipalities in the Netherlands operate their own municipal transit systems, and these are principally located in the country's largest cities. Forty additional municipalities have contracts with regional bus companies to supply strictly local transit. Many towns, moreover, receive a measure of local transit service from regional buses that cross their town limits and pick up and drop off local riders as they distribute their intercity passengers. Regional and local routes in all small towns tend to converge at central business districts and railroad stations to facilitate transfers between modes.

Table 2 gives comparative annual operating characteristics of local transit systems in the Netherlands. As illustrated, approximately 22 percent of local transit vehicle kilometers is provided in contract cities, including rural towns and small urban areas. A smaller proportion of local transit use (measured in passenger trips and passenger kilometers), 11-12 percent, is generated in these towns, which indicates a generally lower load factor in small-city operations. These distance and ridership characteristics exclude that share of local transit service provided by regional buses on intercity routes, as given earlier in Table 1. Such intercity routes are significant for local transit

Figure 3. Service areas of regional bus companies.

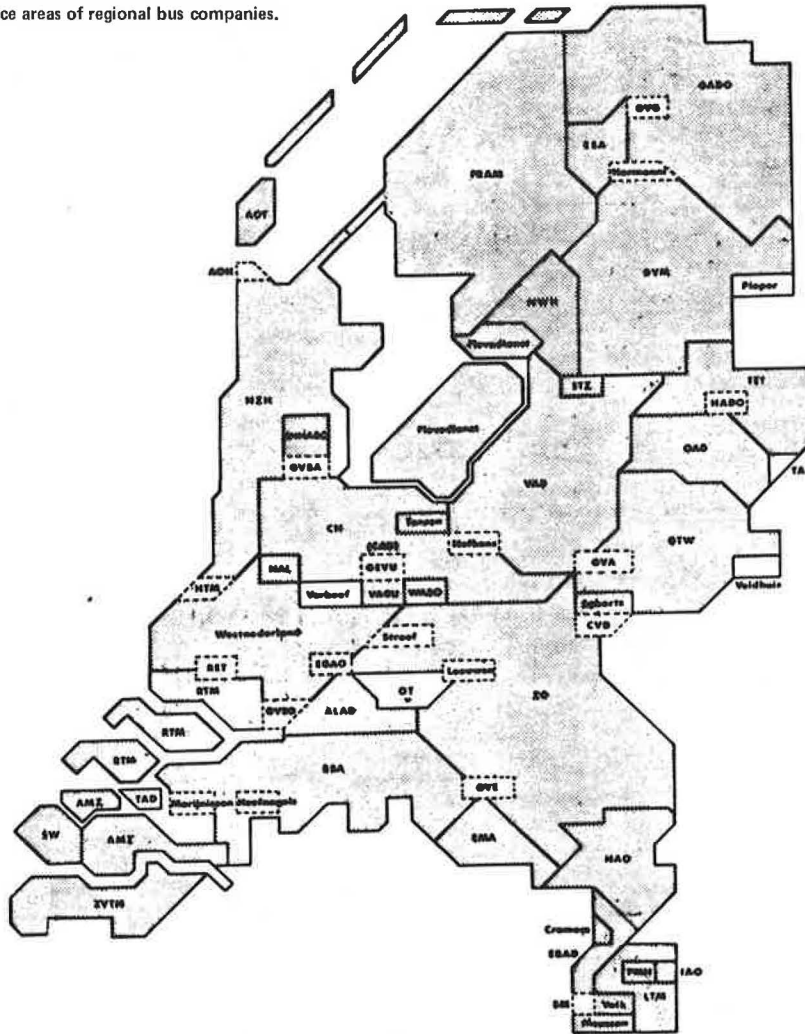


Table 1. Comparative annual operating characteristics of Netherlands rail system and regional bus companies in 1975.

Item	Railroad	Regional Bus Company
Route length (km)	2800	15 000
Rolling stock (no. of vehicles)	2000 <sup>a</sup>	4000 <sup>b</sup>
Vehicle operation (bus-km)	NA	250 million
Ridership (no. of passengers)	189 million	250 million
Passenger distance traveled (km)	8.5 billion	3.2 billion
Avg trip length (km)	45	13

Note: 1 km = 0.62 mile.  
<sup>a</sup>Passenger cars.  
<sup>b</sup>Buses.

circulation, particularly in the small urban and rural areas.

Overall, the amount of local transit service reported in contract cities is large--in aggregate larger than all but two or three of the largest Dutch cities that receive service from municipally operated transit systems. This provides insight into the level of dependence on local transit service by residents of small urban and rural areas and the close interrelation of urban and regional transportation in the Netherlands.

FINANCIAL CONDITION OF LOCAL AND REGIONAL TRANSPORTATION

Until 1969, regional passenger transportation by bus was a profitable business. Since then, the public transportation deficit has increased sharply. Table 3 gives the financial condition of local and regional transportation in the Netherlands in 1975, prior to a decision by the central government to fund all local public transportation deficits from the national budget rather than from local government revenues.

The central government of the Netherlands finances the deficits of transportation operations subject to certain conditions, the most important of which is prior approval by the Ministry of Transportation of the annual budgets and operating plans of the transportation companies. This has led to a growing influence of central government policy on transportation service in the Netherlands.

CENTRAL GOVERNMENT POLICY ON RURAL TRANSPORTATION

The Structure Plan for Transport Policy (4) of the Ministry of Transportation states that, where rural transportation facilities are provided, "care must be taken not to encroach upon the countryside. Facilities provided for traffic and transport must not lead to further migration of city dwellers to rural communities...." The policy emphasizes the

Table 2. Comparative annual operating characteristics of Netherlands local transit service in 1978.

City	Population	Vehicle Kilometers of Operation (000s)	Passenger Trips (000s)	Passenger Kilometers (000 000s)
Amsterdam	719 000	33 833	213 305	811
Rotterdam	582 000	30 559	158 223	633
The Hague	458 000	18 656	95 336	334
Utrecht	236 000	9 287	35 670	148
Arnhem	127 000	4 821	19 298	69
Groningen	161 000	2 994	12 148	36
Maastricht	109 000	3 468	12 499	44
Nijmegen	148 000	3 195	10 632	50
Dordrecht	106 000	2 034	5 344	27
Total	2 646 000	108 846	562 454	2152
40 cities that contract for local transit service with regional operators	2 923 000	31 036	75 870	271
Total	5 569 000 <sup>a</sup>	139 882	638 324	2423

Note: 1 km = 0.62 mile.  
<sup>a</sup>Out of 14 million total.

Table 3. Financial condition of Netherlands local and regional transportation in 1975.

Mode of Operations	Total Revenue (f 000 000s)	Fares		Central Government Subsidies	
		Amount (f 000 000s)	Percent	Amount (f 000 000s)	Percent
Railways	1150	600	52	550	48
Regional bus companies	570	300	53	270	47
Municipal transit companies	635	195	31	441	69
Municipalities that contract for local transit	94	34	36	60	64

Note: 1 f = approximately U.S. \$0.50.

relation between rural transportation and desired rural development.

Toward that end, regional buses that cover short and medium distances are favored for providing most public transportation mobility in rural areas. Railways will continue to provide high-speed intercity service over longer distances.

The current government policy for regional bus transportation is designed to leave the route network largely unaltered except where new towns or new housing projects are developed. Central government policy concerning bus scheduling is designed to relate service frequency to the level of passenger demand, an objective that has been effectively met through the following method.

The table below gives the system of standardized schedule frequency for regional buses:

No. of Buses Permitted per Hour	Necessary No. of Travelers	
	Peak Period	Off-Peak Period
1	8 to 34 or 44	8-24
2	35 or 45 to 84	25-49
3	85-134	50-79
4	135-179	80-139
5	180-224	
6	225-269	140-209
7	270-314	
8	315-350	210-280

During peak periods, a minimum of 8 passengers/h is required to justify 1 bus/h on a given route between two municipalities. Thirty-five or 45 passengers/h are required before a second bus can be put into service (5). The higher level of 45 passengers justifies deployment of a second bus when all passengers travel simultaneously--e.g., when they all depart from work or school at 5:00 p.m. The lower level of 35 passengers justifies a second bus when passengers arrive for service randomly throughout the hour. Increments of 40-50 additional passen-

gers/h are necessary for each additional bus deployed during peak hours.

Lower levels of demand are necessary for additional buses beyond one per hour during off-peak periods. On some routes that have very low passenger volume, as few as 3 round trips/day are permitted for a minimum of 8 passengers/day. The basic vehicle for this system of standards is the conventional 45-seat regional bus.

One final element of national transportation policy with implications for rural passenger transportation is the introduction of a unified national transit ticket. The "strippenkaart", as the national pass is called, is a multiple-trip ticket that applies to any transit carrier in the country. The 15 zones of travel permitted on each strippenkaart can be used in a series to allow lengthy trips on regional buses, shorter trips on local transit, or a combined trip on both modes. The national transit ticket is intended to promote integrated use of regional and local transportation services to any location in the country and thus improve the mobility of rural passengers.

#### CONCLUSIONS

A strong policy commitment to integrated transportation in the Netherlands has led to a highly developed passenger transportation system, including excellent mobility for rural inhabitants. The main reasons for this have been the high density of population and the relatively short distances between cities. There are hardly any areas in the Netherlands inaccessible by public transportation.

Alongside a policy of extensive national transportation service has been a recognition that traffic and transportation are essential elements in regional development planning. Improved passenger transportation in rural areas has helped to preserve the rural way of life by affording access to important urban jobs and services. Simultaneously, rural

land use controls have prevented suburbanization and urban sprawl into rural areas.

The lesson of the Dutch experience for other countries is that rural transportation is most effective when integrated with national transportation policy and linked to clear objectives for rural area development.

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