

TRANSIT SERVICES IN JUDEA AND SAMARIA

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One of the often mentioned factors in the process of directed development in rural areas is the deficiency in quality and quantity of services such as transport and communication (World Bank, 1978). Studies from Southeast Asia (Berger, 1979) showed that when services are made available, use increases rather dramatically, whereas where service delivery patterns do not change, neither does service utilization. These findings also support the findings from a study in Indonesia (Leinbach, 1981) which points to the importance of complementary development efforts where services, facilities, and transport are improved. Yet the impact of undirected growth in rural areas on the transport system has not been given much attention in the literature. More specific is the question of what happens to the quality and quantity of the transport system in the case of rapidly self-growing regions where transport investments are not provided by the central government. Furthermore, what are the major trends within the transport sector in such regions which due to their economic growth are facing an increase in the mobility needs of their residents. The recent economic changes taken place in Judea and Samaria and the consequent changes in its transport sector can be used to suggest some answers to these questions.

Judea and Samaria (denoted hereon as J&S) form part of Israel's central massif, Judea covering the area from Jerusalem to the Beer Sheva valley in the south, and Samaria comprising all of the mountains from Jerusalem to the Jezreel Valley in the north. Both areas (totaling 5,700 sq. km.) which contained 712,000 Arab inhabitants in 1979, were cut off from Israel by the 1948 Israel-Jordanian armistice line. During the Jordanian rule in the area until the Six Day War in 1967, all the transportation contacts were solely oriented toward the Kingdom of Jordan (Efrat, 1977). The 1967 War opened the area to both Jordan in the east and the Mediterranean coast in the west. This geo-political change opened new job markets and new economic opportunities to the J&S population.

Increasing employment of J&S workers in Israel has eliminated unemployment and even created labor shortages in J&S (Kanovsky, 1976). Consequently the labor profile has been changed, being characterized by a high inter-sectoral mobility of unskilled workers from the primary sector to the secondary and tertiary sectors. While such a process in developing countries is

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usually associated with a high rate of urbanization, which in turn creates social and housing problems, the inter-sectoral shift in J&S has been practiced without residential relocation (Litwin, 1980). Because of the small geographical dimensions of the area the workers did not move out from their rural villages but instead they became more dependent upon transportation services. The unchanged residential structure has not only prevented the growth of low-income suburban communities, usually associated with accelerated urban growth, but instead enabled the rural population to use a significant part of their disposable income for housing improvements in the rural areas. A recent study (Reichman and Lapidot, 1977) confirmed this observation, indicating high rates of residential construction in the rural areas, primarily along the main roads.

The changes in the internal economy of J&S taken place since 1967, which are a direct consequence of the political changes, are assumed to have affected the region's transportation structure. This paper is aimed to examine the transport changes in J&S during the Israeli rule, especially focusing on changes in the public transport market which is still being the major mode used. The general features of public transport provision in J&S may also be of comparative interest to those studying rural transport systems and public transportation in developing regions.

GENERAL ECONOMIC AND TRANSPORT CHARACTERISTICS

The new economic opportunities opened to the J&S population gradually affected unemployment rates. In 1969, 6.1 percent of the labor force was unemployed whereas in 1978 the unemployment rate decreased to only 0.8 percent (Central Bureau of Statistics, 1979). The contacts with Israel also revealed an increase in production, especially in agriculture which has benefited from the adoption and adaption of Israeli technology. The Gross National Product (GNP) in J&S has increased, for example, from IL. 2,361 million in 1974 to IL. 11,805 million in 1978, and the Gross Domestic Product has increased from IL. 1,867 million to IL. 9,253 million respectively. Moreover, the 1968—1978 average annual GNP per capita growth has been 11.0 percent whereas the average annual growth of private consumption per capita, during the same period, has been 7.3 percent. The changes in the economy and the reduction in labor needed in agriculture due to the introduction of new technology increased the need for mobility especially from the rural to the urban areas. Consequently, the number of licensed drivers increased from 4,868 in 1967 to 25,634 in 1979, thus presenting a growth of 426 percent in a 12 years period. Simultaneously, the total number of vehicles increased in about 420 percent at the same time (Fig. 1). The highest increase was of private cars (over 574 percent) and the lowest was of both transit modes — buses and taxicabs (31 and 17 percent respectively).

The number of private cars per 1000 people increased in J&S during the Israeli rule by 93 percent but the relative number of buses per 1000 people has not changed (Table 1). The most striking figure is the 433 percent increase in the number of trucks per 1000 people which indicates the increasing demand for cargo transport generated mainly by the agricultural and the construction

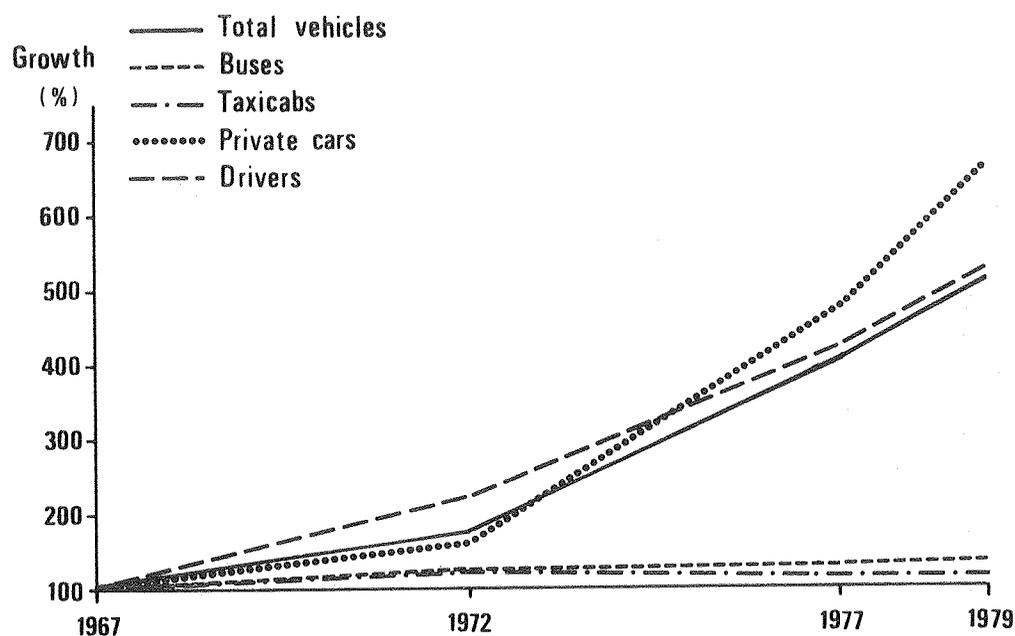


Fig. 1: Growth of motor vehicles and drivers in J&S, 1967-1979.

sectors. It is noteworthy that truck owners in J&S also use their trucks substantially for non-work purposes.

Because of the dispersed spatial pattern of the labor force and yet the low level of car ownership when compared to Israel (85 private cars per 1000 people in 1979), it seems reasonable to consider it as the main customer of the inter-urban transport market. The labor force, about 213,600 persons in 1978, is comprised of those working within J&S (83 percent of the labor force) and those working outside the area (17 percent). The workers employed within J&S are probably the major users of the local public transport services despite the high increase in private car ownership as presented in Table 1.

Table 1: Number of Vehicles per 1000 people in J&S, 1967 and 1979.

Type of Vehicle	1967	1979
Buses	0.6	0.6
Taxicabs	1.6	1.2
Private cars	6.4	12.4
Trucks	1.8	9.6
Total	10.4	27.9

Source: Israel Defense Forces, 1967; Transport Governor Office, 1979.

Scheduled bus services between the Arab settlements in J&S and the Jewish settlements outside the area are virtually non-existent and J&S workers employed outside the region depend on other means of transport. The latter are comprised of 77 percent rural residents, 12 percent urban residents, and 11 percent residents of refugee camps. These workers commute to work by either charter bus services provided by their employers or by illegal "gypsy operators" and shared-ride taxicabs. This part of the labor force depends however on transit services for non-work trips. The carless population, especially in the remote rural areas, also depends on public transportation which seems, as indicated in Table 1, to have remained unchanged since 1967 in terms of riding opportunities despite the high population growth rate during this period. However, the Israeli rule in J&S have brought some changes into the transit market which has improved transit access inequalities. The structure of the transit sector and its undergoing changes are described in the following sections.

TRANSIT ORGANIZATION

The organization structure of public transport in J&S is almost inverted to that existing in the rest of the country. The public transport system in J&S is based on a large number of small, private, family-owned companies while this sector in other parts of Israel assumes a monopolistic nature (Berechman, 1980), and based mainly on one large and one medium-sized companies. Both in J&S and Israel the government plays the major role in determining such matters as licensing, fares, routes, and schedules. Albeit the administrative control of the government over the private companies in J&S, the companies are not eligible to any kind of governmental subsidy since they are not levied income tax and do not submit financial reports to neither the Israeli Ministry of Finance nor to the Ministry of Transportation. Financial reports are submitted only when a concession for a new service route is requested. Such reports, when submitted, always present a negative economic balance. Furthermore, such reports are sporadic in time and do not represent the total transport market. Samples of economic data collected from several companies appeared non-reliable and therefore any economic analysis regarding the operational efficiency of the J&S transit system, and any economic comparison with the Israeli transit system, is impossible at this stage.

During the Jordanian rule up to 1967, 160 companies (including tourist transport agencies) were registered in J&S with a total fleet of 578 buses (Israel Defense Forces, 1967). After 1967 the number of companies operating a scheduled service in J&S decreased. Some Jordanian-owned companies ceased operation and simultaneously a consolidation trend took place as small companies were taken control by larger ones. Further, due to the large increase in car ownership, from 6.4 private cars per 1000 people in 1967 to 12.4 in 1979 (see also Fig. 1), the few companies added to the register were mainly firms providing charter and tourist services.

Prior to 1967, over 90 percent of the transit owners (147 private companies) controlled only over 55 percent of the total bus fleet, each company owning, at the most, four buses (Fig. 2). Only four companies owned over 21 buses each, totaling to 17 percent of the bus fleet. Two of these largest companies were (and

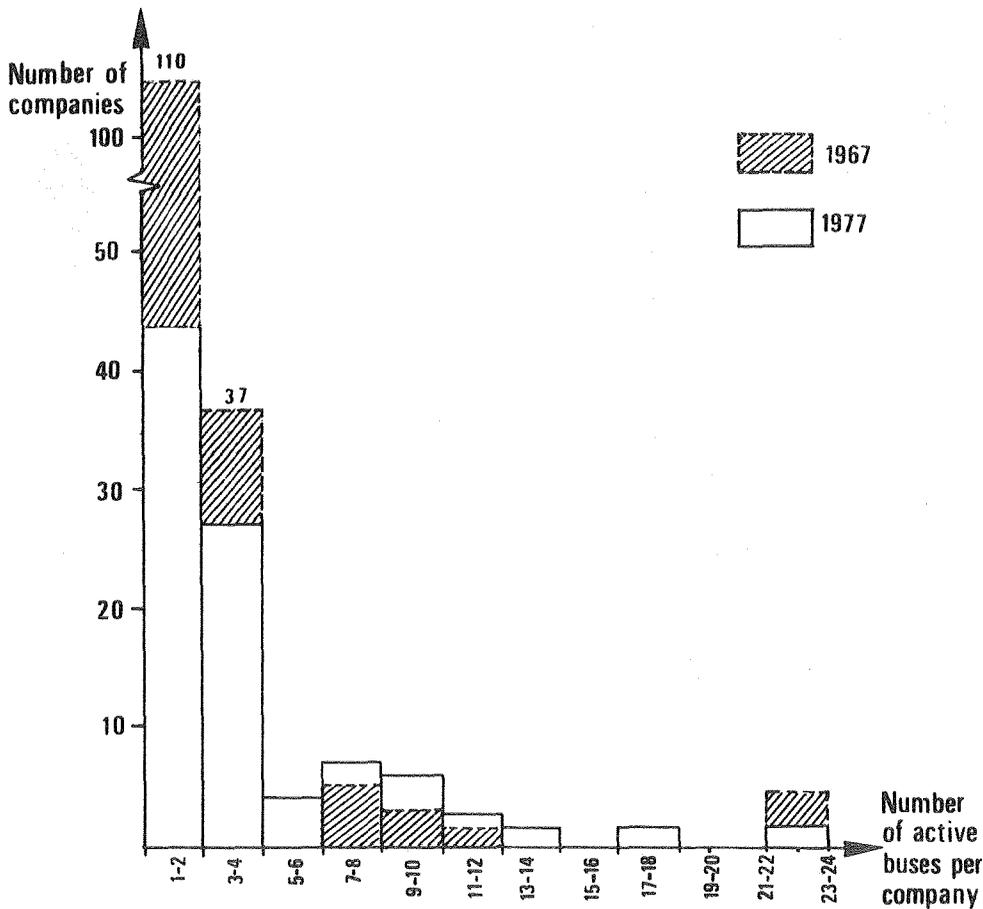


Fig. 2: Distribution of bus companies by size.

still are) headquartered in Nablus, one in Ramallah, and one in Hebron (Fig. 3). The consolidation trend taken place after 1967 is clearly noticed in Fig. 2 which presents the changes in the distribution of the transit firms by size between 1967 and 1977. In 1977 the transit market contained 108 registered buses, of which only 361 were in operation (Table 2). The consolidation trend, however, is very slow since most of the companies are family type businesses which traditionally in J&S are unlikely to be transferred.

Two regions, Nablus and Hebron, contain the largest amount of registered buses whereas the Jerico region contains the least (Table 2). Nablus and Hebron comprised also two out of four regional transport councils (including Jerusalem and Jenin) operated in J&S during the Jordanian rule. The councils served as intermediate administrative bodies between the owners of the bus companies and the Jordanian Ministry of Interior who was the only one to authorize route concessions and determine the number of buses allowed to serve each route. In rush periods like holidays or special market days, the Ministry could authorize

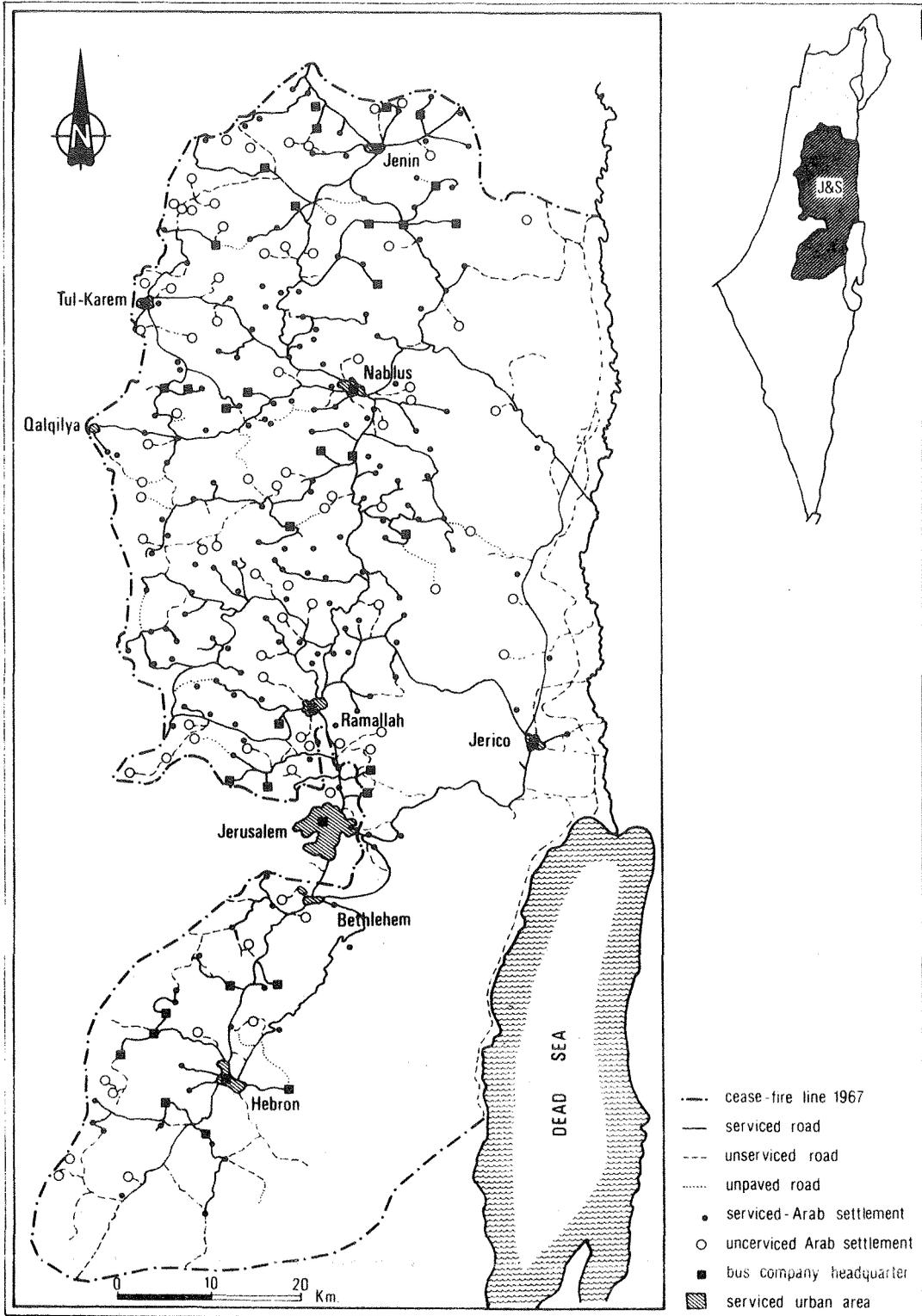


Fig 3: The Arab bus service network in J&S, 1979.

Table 2: Distribution of Transit Companies and Buses in J&S Service Regions,* 1978.

Service region	Companies			Buses		
	in operation	not in operation	total registered	in operation	not in operation	total registered
Jerusalem	9	—	9	29	3	32
Ramallah	9	2	11	44	22	66
Hebron	18	2	20	89	11	100
Bethlehem	10	1	11	48	12	60
Tul Karem	7	1	8	15	6	21
Jerico	2	4	6	20	5	25
Nablus	26	4	30	83	33	116
Jenin	13	—	13	33	5	38
Total	94	14	108	361	97	458

Source: Transit Register, The J&S Military Transport Governor, 1979.

* The service regions are presented in Fig. 3.

concessions to more than one firm on the same route. In such cases a temporary cartel was established to handle allocation of revenue among operating companies. Since 1967 a special Israeli military transport governor replaced the four regional transport councils. The transport governor office, operating under the regulations of the Israeli Ministry of Transport, controls concession renewal, fares, and service frequency. However, regulations are not firmly imposed on the local Arab companies and as a result official tariff is not kept, schedule is frequently not met and, further, the schedule is not published in most rural areas. The operators, wherever possible, adjust the service in terms of routes, bus stops, and frequency to the changing demand. In rural settlements in which the family companys' headquarter is located, the service, for example, economically exceeds the local demand.

The small companies run their business with family employees whereas the large firms employ outside drivers. There are no sales promotion efforts, no drivers union, and very few cases of bus fleet renewal. Buses produced in the 1950's and 1960's are characterizing the transit fleet in J&S. Only companies owning ten buses of more are making efforts to renew their bus fleet. The bus register reveals that 20 percent of the buses in J&S are models manufactured before 1952, 30 percent are 1952—1960 models, 35 percent are 1961—1967 models, and only 15 percent of the buses were manufactured after 1967. The fleets' age obviously affects the low level of local service.

The fleets' age also implies potential safety problems. Consequently the administrative authorities have recently announced new regulations aiming to prevent the operation of buses manufactured before 1955. The authorities are also planning to financially assist the companies in the renewal of their fleet. Although this is a change in the general policy of the Israeli authorities, we can expect only partial fleets' renewal because of financial disability of several small

companies to renew their fleet even with governmental subsidy. In this case the level of service will further decrease due to the expected decrease in the number of the operating companies resulted from their disability to keep up with the new regulations.

THE SERVICE PATTERN

The transit services in J&S are comprised now of 183 different scheduled bus routes of which 116 routes provide intra-regional services, 58 routes provide inter-urban services, and only 9 routes provide intra-urban services in the main cities (excluding the intra-urban services in Jerusalem provided by the Israeli Egged company). Most of the intra-urban transit services are provided by taxicabs. In many urban areas the road width and layout prevents the operation of modern full size buses.

The spatio-functional distribution of bus routes has changed since 1967 (Table 3). During the Jordanian rule about 12 percent of the bus services were provided in urban areas (as compared to 40 percent in Israel) with an equal share of intra-regional and inter-urban services each of which with approximately 43 percent of the total number of service routes. The low amount of intra-urban services is probably due to the relative small size of the urban centers in J&S and the reasons mentioned above: road layout, and consequently competition of intra-urban services of taxicabs. Table 3 shows that the number of intra-urban routes has decreased to 4.9 percent since 1967 whereas the number of intra-regional routes has increased in about 20 percent. The intra-regional service basically provides access from the small villages to the regional cities and the increase of this type of service since 1967 perfectly coincides with the type of the urban sprawl into the rural areas taking place in J&S in the last twenty years (Efrat, 1977).

Table 3: Distribution of Bus Routes (in Percent) in J&S by Type of Service, 1967 and 1979.

Type of Service	1967	1979
Intra-regional	42.4	63.4
Inter-urban	43.9	31.7
Intra-urban	11.7	4.9
Total	100.0	100.0

Source: Israel Defense Forces, 1967; Bus Register, 1979.

Bus routes in J&S cover the majority of the road network. However, 20 percent out of the 396 settlements in the region do not have an immediate access to a bus line. The majority of the unserved settlements are located 3—4 miles away from the nearest bus route and some are located even further (Fig. 3). Such a situation of an unserved settlement does not exist in the rest of the country where every settlement is connected to the bus service network.

It is also interesting to note that the headquarters of the 108 firms are located in 40 different settlements throughout J&S. This pattern of headquarters location has a noticeable effect on the level of service in certain areas. Those areas in which headquarters are located are characterized by a higher number of bus

departures than would be expected economically solely due to the fact that the owners/operators reside in the area.

The amount of bus services provided to J&S communities is measured by the absolute number of bus departures. In Jenin, Nablus, Ramallah, and Hebron the daily number of intra-regional bus departures is larger than the daily number of inter-urban departures whereas in other regions (see Fig. 4) the situation is reversed (Table 4). This pattern reflects the role of those four cities as strong regional centers in J&S. Bethlehem also serves as a regional center although its sphere of influence is small and strongly influenced by the proximity to Jerusalem. Jerico and Tulkarem-Qalqilya regions are subsidiary centers of Jerusalem and Nablus respectively.

Table 4: Number of Bus Departures by Service Region and Type of Service, 1979.

Service Region	Intra-regional	Inter-urban
Jenin	127	23
Nablus	97	72
Tulkarem-Qalqilya	35	41
Ramallah	189	90
Jerusalem	99	131
Jerico	4	17
Bethlehem	84	119
Hebron	122	37

Source: Compiled from data received from the transportation governor of J&S.

The spatial pattern of bus frequency in J&S (Fig. 4) enables to extract the functional structure of its urban system. The frequency divide lines were used to delineate the boundaries of eight service regions which also reflect the sphere of influence of each of the regional urban centers. As seen clearly in Fig. 4, the service frequency of routes emanating from each of the central towns decreases as the distance from the towns increases. The most intensive and largest service regions are those of Nablus, Jenin, Ramallah, and Hebron. The frequency pattern also indicates that Jerusalem serves as an intermediate terminal between Samarian and Judean transit systems. The bus service data further reveal that there is no direct service between Samaria and Judea, and the Jerusalem terminal is used as a transfer point. However, while Jerusalem is the busiest terminal for inter-urban bus trips, Ramallah is the major terminal for intra-regional bus trips. Comparison with the service pattern that existed in J&S before 1967 (Zehavi, 1976; Israel Defense Forces, 1976) indicates that since 1967 Ramallah has (together with El-Bira, its twin city) gradually become the transportation capital of J&S. The primacy of Ramallah in transport service terms can be seen in Fig. 5 which represents the interaction pattern of the J&S urban centers as based on the frequency and connectivity of the inter-urban and intra-regional bus system.

The interaction pattern was constructed with an index of bus service supply developed by Stern (1979). Applying the properties of Dependency, Transitivity, and Assymetry suggested by Nystuen and Dacey (1963), and the above index

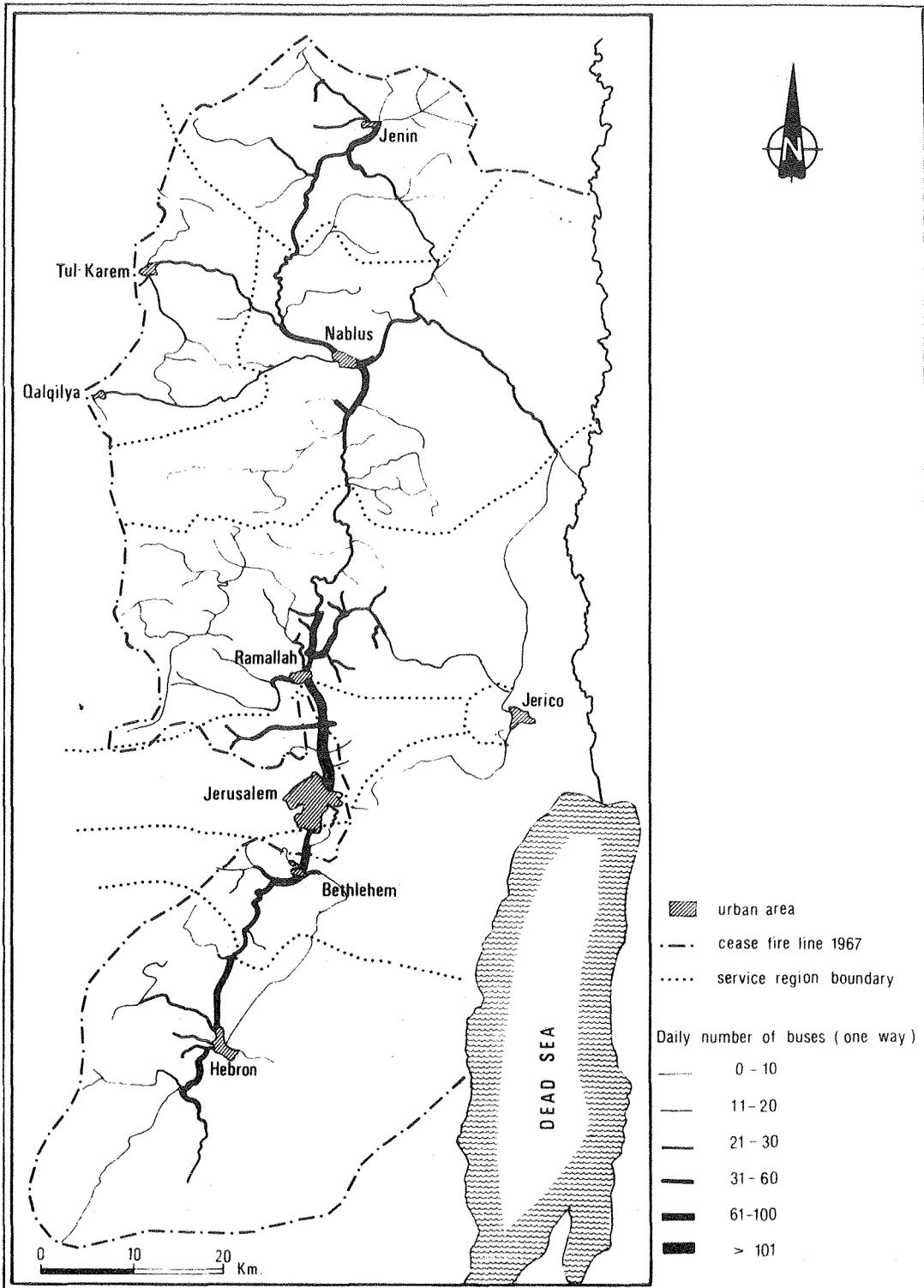


Fig. 4: Frequency of bus services and service regions in J&S, 1979.

for the J&S case indicates the existence of a nodal hierarchy including three independent systems, three subordinate cities with some dependence (Jerusalem, Nablus, and Bethlehem), and several subordinate cities without dependence. The largest independent system is focused on Ramallah as a main terminal while Jerusalem became its subsidiary in public transport terms. Bethlehem in the south and Nablus in the north are also subsidiary to Ramallah although lower on the nodal hierarchy. Hebron and Jenin have become the main terminals of the two small southern and northern independent transit systems respectively.

It seems that the basic service routes have not been changed since 1967. However, the relative growth of the cities and the increasing demand for urban services influenced the inter-nodal association of bus services, thus turning J&S from a nodal to a functional region.

THE TARIFF STRUCTURE

The tariff of scheduled bus services in J&S is determined, as previously mentioned, by the military transport governor. Although the bus services are not subsidized, the riding fares, on the average, are 30 percent lower than the fares in Israel. Prior to the Israeli rule in J&S the tariff spatial structure reflected the centrality and primacy of Jerusalem at the developmental expense of the other cities in J&S. Thus, and not without surprise, while the bus riding cost per kilometer for trips to and from Jerusalem decreased linearly with distance, the opposite was practiced for non-Jerusalem oriented trips (Fig. 6). It is clear that trips to Jerusalem were relatively cheaper than any other trips in J&S. Such structure imposed regional bias, especially on the periphery of cities other than Jerusalem. Although this observation is based on analysis of the relative riding cost of only the major serviced settlements in J&S, it appeared highly significant ($r = 0.97$ with $p < 0.001$) as seen in Fig. 6. Obviously this tariff structure did not have any economic or social rationale and therefore has been changed after 1967.

The data for the pre-1967 period enabled for only an aggregate analysis (Jerusalem versus the rest of J&S cities), but the current data enable an analysis of the tariff structure including all the serviced settlements in J&S. A negative power function of the form $y = ax^{-b}$ was found to best fit the data for both Jerusalem-oriented bus trips and trips to the other major cities in the study area. Fig. 7 presents the results of the tariff structure analysis for 1979. The correlation coefficients are ranging from -0.53 for Hebron-oriented trips to -0.92 for Bethlehem-oriented trips, all of which are significant at $p < 0.001$. It is thus clear that the riding cost per distance unit is decreasing with the increase of distance for all inter-urban and intra-regional trips in J&S. The 1979 tariff spatial structure for non-Jerusalem-oriented trips is opposite to the one existed during the Jordanian rule, thus imposing more regional equity in terms of bus service cost. Moreover, the riding cost per distance unit is decreasing more rapidly with distance for trips originated in the rural settlements and destined at the small cities (Bethlehem: $b = -0.51$; Tulkarem: $b = -0.43$; Jenin: $b = -0.37$) than to trips destined at the large cities (Hebron: $b = -0.14$; Jerusalem: $b = -0.16$; Ramallah: $b = -0.18$; Nablus: $b = -0.27$). Such a structure reduces the friction of distance to the smaller cities in J&S and accordingly increases their functionality as

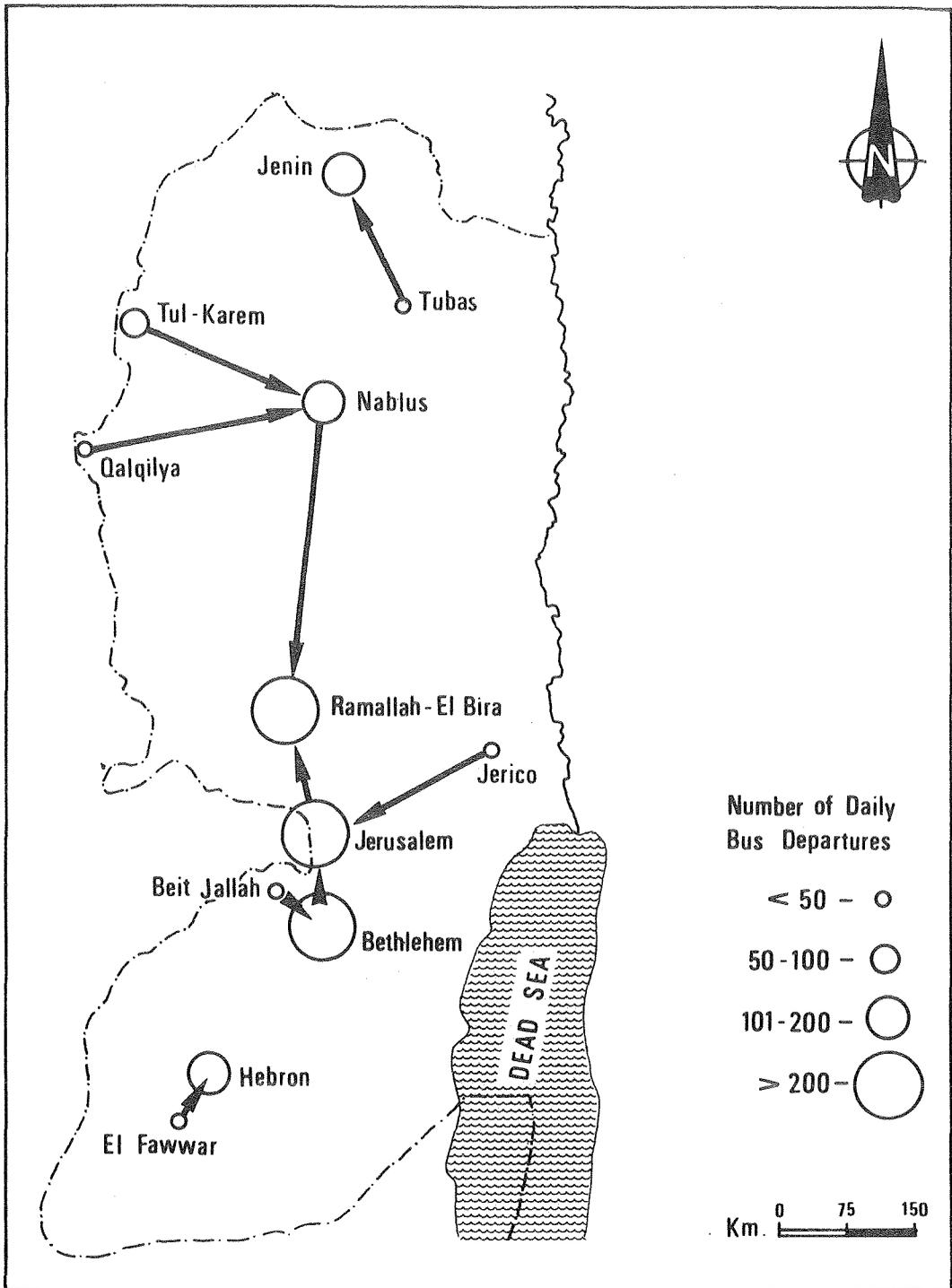


Fig. 5: Interaction pattern based on bus services in J & S, 1979.

Riding cost
per km. (in IL. Agorot)

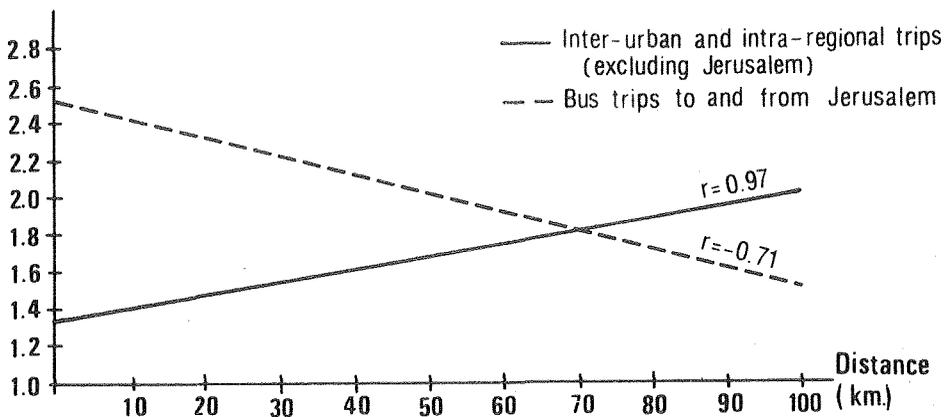


Fig. 6: The relationship between bus riding cost per km. and distance in J&S, 1967.

central places. It should be noted that such reduction of distance friction was already found as a possible means to increase functional centrality of regional centers (Shefer, Goldmann, and Shear, 1975). Moreover, tariff policy such as the one practiced in J&S which strengthens the linkages between the rural settlements and the second-order urban centers rather than with the first-order town (e.g. Jerusalem) was found appropriate in reducing spatial economic inequality in Israel as well (Shachar and Lipshitz, 1981).

Despite these regulatory efforts to reach a better spatial equity, the bus companies frequently charge fares lower than the official ones due to competition in the transport market. Since car ownership has increased rapidly since 1967 the automobile has become a significant alternative to the intercity bus service. However, two other transport alternatives, which have already been mentioned, are sharing the market. The first alternative is shared-ride taxi service based on a fleet of 891 vehicles, and the second are "gypsy operators". These are illegal operators of intercity vehicles, whether small trucks, or vans. Because these carriers are operating without authority, and therefore without restrictions, and do not have the costs of carrying the minimum amount of insurance, they can offer lower rates than licensed carriers. The shared-ride taxicabs, on the other hand, were authorized to charge prior to 1967 fares which were 60 percent higher than the bus fares (2.97 IL. Agorot per kilometer versus 1.86 IL. Agorot per kilometer respectively) while in 1979 the difference in the official fares has decreased to only 39 percent. This difference in the official riding fares have almost disappeared along the highly served bus routes since the taxicab sector is at its full capacity (Transportation Governor Office, 1979). Both the "gypsy operators" and the taxi services are therefore successfully competing with the unsubsidized bus companies.

The multi-modal, privately owned, transit system in J&S thus presents an opposite structure to that existing in the rest of the country where even the

Riding cost
per km. (in IL. Agorot)

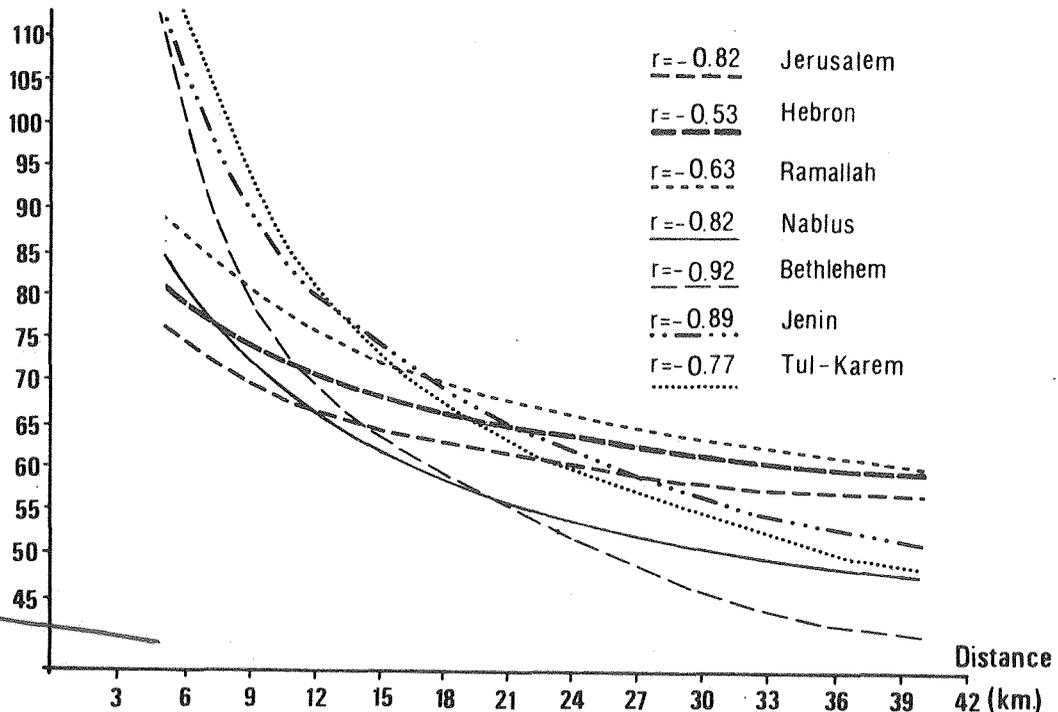


Fig. 7: The decrease of bus riding cost per Km. with distance to major J & S cities 1979.

competition between taxi services and buses in terms of riding fares is controlled, and illegal gypsy services do not exist. With this regard the Israeli administration in J&S does not contribute to the development of its bus transit services but since the total market is privately-owned, unable to grow independently, the administration is attempting to turn the shared-ride taxi services into an equitable mode. Such an approach obviously weakens, in turn, the self-ability of the bus companies to expand their fleet and services.

SUMMARY AND CONCLUDING REMARKS

The major changes in the transport sector in J&S during the 14 years of Israeli rule are mainly the rapid growth in the number of licensed drivers, private cars, and trucks. Increasing mobility needs and higher dependency upon transport services can partially explain these rapid growth trends. Regarding the bus transit services, no relative improvements have been observed except for a more equitable tariff structure and few changes in the inter-urban and intra-regional bus frequencies. These however contributed to the development of a more functional structure of the region when compared to the nodal structure existed during the Jordanian rule.

There has been no official interference in the organizational structure of the

transit market and no efforts to change route concessions for the benefit of service improvement. The lack of operational control and the authorities disability to prevent competition of illegal operators are playing against the development of the bus transit market. Illegal transit modes and shared-ride taxi services probably satisfy the riders since they provide demand-responsive and relatively cheap door-to-door services, a system which seems to fit the dispersed pattern of population in the area. However, stabilization of the transit market will contribute to increasing car ownership and consequently to the generation of traffic volumes which would not be absorbed by the present narrow road network in Judea and Samaria.

In summary, an undirected economic growth process has neither changed the quality nor the quantity of the local transit services. It therefore seems that only a directed development process which can affect transit service levels may increase inter-urban transit usage in the rural areas.

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