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WASTE COLLECTION AND DISPOSAL IN LOCAL AUTHORITIES: A PROPOSAL FOR REFORM

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Introduction

My grandmother used to darn all her worn-out socks, but my mother no longer did. My mother will bring a broken watch in for repair, but I won't. Will my grandchildren trash their cars instead of taking them to the garage for repair?

Easy come, easy go, but we pay a high price for this ease. We pay, in fact, far more than the total real value of all the objects, materials and resources we so easily part with every day. Trash is where basic, palpable things connect with incisive, complex and burdensome social and moral questions.¹

This comment, by landscape artist Rachely Merchav in an Israeli environmentalist magazine, clearly illustrates our attitude to the subject of garbage.

Most people realize that waste is an inevitable product of the activity of human society. It derives from various sources and thus bears different attributes. For most Israeli citizens, domestic waste is a passing nuisance; one that vanishes the moment the municipal garbage truck removes household garbage to the landfills where it is interred.

In recent years, the Israeli public has reached a state of heightened awareness regarding garbage, its removal and disposal. Waste began to figure as a topic on the national agenda after a number of nationwide and local strikes led by the Histadrut, in its battle against the Ministry of Finance and various local authorities. It was not until mounds of garbage began piling up in the

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the streets that Israeli citizens started to think about what happens to the household garbage bag after it is thrown into the bin, and what price is paid for its removal.

In Israel, traditionally, the local authorities bear full and sole responsibility for waste collection and removal. Sanitation services, including garbage removal, are one of the obligatory services that local authorities are required to provide their residents. The responsibility and authority to provide this service lies in the Municipalities Ordinance, and in the Local Councils Order. The various government ministries (mainly the Ministries of Environment and the Interior) set procedures and regulations for the local authorities. To date, however, there is no agreed or binding procedure and the local authority has discretion.

This study will prove that the local authorities' control of the garbage collection industry causes a tremendous waste of Israeli taxpayers' money. The overall cost of garbage collection by the sanitation divisions of two towns we examined, namely Tel Aviv–Jaffa and Netanya, is an annual \$42 million higher than a market price would be. This is based on the prices charged by private companies that collect some of the garbage in those towns.

This *Policy Studies* reviews garbage collection trends in Western countries, showing that the current trend is toward a reduction of involvement by the authorities, enabling private companies to operate in the field. Also, the study reviews the current structure of the garbage collection industry in Israel, illustrating the advantages the private sector has in this field. The last part of the study sets forth a series of policy recommendations, which will save, and then properly utilize, taxpayers' money.

Israel's Special Features

As stated, garbage removal has traditionally been the province of the local authorities, as part of their responsibility for guarding public health. Since it was founded, the state of Israel has instituted no reform so far as waste management is concerned. The state's centralist regime saw to it that the private sector failed to develop, or integrate into the garbage industry. It did this by imposing restrictions and erecting entry barriers (as enumerated below), while the local authorities and trade unions actively cooperated in putting obstacles in the path of the private sector. Also, a number of features peculiar to Israel make the matter of waste disposal highly complicated:

1. In the year 1998, Israel's population growth rate was estimated at 2.4 percent per annum.² This is one of the highest rates in the Western world, and is attributable to Israel's character as an immigrant-absorbing nation. In the past decade, about one million new immigrants arrived in Israel (accounting for some 16 percent of the nation's citizenry today). Most people hailed from the Former Soviet Union. A significant increment to the population, over and above the rate of natural increase, makes a significant contribution to the quantity of garbage generated in this country.

2. A rapid rise in the Israeli public's quality of life and consumption level in the past decade explains a two to three percent rise in the total annual increase in the quantity of garbage in Israel, which comes to five percent.³

3. These latter features have combined to produce another: a population density that is one of the highest in the world's developed countries, amounting to 630 persons per square kilometer, north of Beer Sheba. The forecast published by the Central Bureau of Statistics estimates a density of 800 persons per square kilometer by the year 2020.⁴

This state of affairs results in low availability of potential interment (sanitary burial) sites for garbage, because of a shortage of land area. Given the risks involved in interment, a landfill should possess a number of attributes: it must not be hydraulically sensitive, it must be remote from population concentrations, yet accessible, and it should cause minimal damage to the landscape.⁵ Therefore, low land availability in Israel currently causes the landfills to be more remote from the municipal authorities' area. Thus, both because of the travel distance that has increased and because of the rise in land prices, the cost of garbage treatment for local authorities is rising.

The above attributes have combined to produce a situation in which the quantity of waste in Israel is regularly increasing, from year to year, in terms of weight and, more importantly, in terms of volume. In 1999, each citizen generated 1.69 kilograms of solid urban waste daily. The annual quantity of solid urban waste, including domestic waste, yard waste and commercial and light industrial waste, excluding building waste, amounted to some 3.7 million tons.⁶ General solid waste, including agricultural waste, sludge (muck), polluted soils and building waste, amounted to 7 million tons in 1999.⁷

It is important to note, however, that the quantity of garbage generated annually is increasing the world over, as a result of population growth and the rise in living standards, which is usually attended by a rise in the quantity of garbage per capita. It must be understood that waste is an inevitable concomitant of almost all human activity. Therefore a positive ratio exists between numbers of people and the quantity of waste they accordingly generate. The link between living standards and waste quantities is attributable to the fact that a higher living standard means a relative increase in the various types of packaging, an increase in the plastic component of packaging and a relative reduction in glass packaging and containers. This results in a growing quantity of containers that are difficult to recycle or reuse. This all adds up to a larger per capita quantity of garbage.

Urban waste in Israel today makes up a volume of 27 million cubic meters, a volume equivalent to one thousand 10-storey residential buildings; and this quantity is increasing at a rate of five percent per annum. Table 1 gives the forecast of the Ministry of Environment (hereafter: MOE) as to garbage quantities in Israel. The MOE anticipates that by 2020 solid urban waste quantities will reach 12 million tons per annum, while general solid waste will amount to 18 million tons per annum.

Table 1
Urban Solid Waste Quantities Anticipated in Israel by 2020

Year	2000	2005	2010	2020
Quantity manufactured (million of tons per annum)	4.5	5.5	7.4	12
Cumulative quantity (millions of tons)	4.5	30.6	63.9	161
Volume manufactured (cubic meters)	27	183.6	383.4	964.2

Source: Tal Shochat, "Policy of Handling Solid Waste," memorandum to Ilan Nissim (Ministry of the Environment, Jerusalem, 2000). [Hebrew]

This forecast indicates that the problems with which Israel's local authorities are grappling, as far as garbage is concerned, will merely be exacerbated in future years, since garbage quantities are rapidly increasing. Accordingly, the topic of garbage services needs to be re-examined, and a decision reached as to which concerns are better equipped to deal seriously and efficaciously with this matter: the local authorities or the private sector.

Do We Know What Quantities of Garbage are Generated Annually in Israel?

To illustrate the seriousness of Israel's waste management situation, we may point out that until 1996 a large majority of local authorities in Israel made no report whatsoever to the MOE as to the weight of garbage manufactured within their jurisdiction. Moreover, there are authorities that for many years, some even to this very day, simply never bothered to weigh the garbage in the territory under their purview.⁸ Failing to report garbage quantities for the 2001 *Statistical Abstract* were the municipalities of Rishon LeZion, Arad, Kiryat Ata, Umm El-Fahm, and dozens of other local and regional authorities. The MOE maintains that, despite the regularly repeated requests it has made every year since it was founded in 1989, a large number of local authorities in Israel fail to forward any information as to the quantity of garbage manufactured by their residents. In the absence of relevant data, the MOE and Israeli residents have had, perforce, to rest content with very rough estimates of the quantity of waste manufactured in Israel.⁹ It is important that it be understood that the garbage problem cannot be seriously addressed unless annual quantities of garbage manufactured in Israel are known.

Until 1996, the only garbage quantities weighed tended to come from two sources: the garbage generated by the residents of Gush Dan (the Dan Bloc, or Tel Aviv and the country center), which was removed to the Hiriya landfill; and that collected and removed by private contractors in the local authorities. The landfill at Hiriya charged the local authorities interment fees for dumping the waste at the site, and it therefore had to be weighed. Private companies removing garbage from local authorities and burying it at Hiriya or some other site, likewise collecting interment fees, weighed the garbage they removed, since they wanted to charge the local authorities for interment fees in addition to the costs of removing the garbage. Private companies or local authorities dumping garbage in the public domain naturally did not bother to weigh the quantities of garbage polluting the environment. Rishon LeZion is one example of this type of local authority. Even though Hiriya is situated less than half an hour's drive away, Rishon LeZion elected to operate an independent garbage dump within its own jurisdiction. Rishon

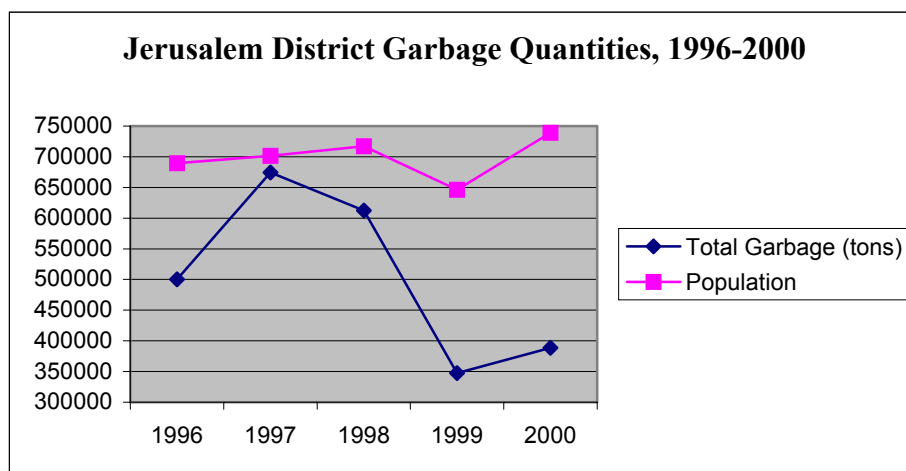
LeZion, needless to say, does not bother, for the reasons outlined, to report on the quantities of garbage interred there annually.¹⁰

In 1996, the Central Bureau of Statistics formed the Division of Environmental Quality and Agriculture. That same year, the bureau began issuing requests for information regarding the quantity of garbage manufactured within the jurisdiction of each local authority. As of 2000, only 60 percent of all local authorities in Israel report the garbage quantities manufactured within their jurisdictions. The rest of the waste is removed to unregulated sites, or, as the head of the solid waste division of the MOE puts it: “to the nearest wadi.”¹¹ Accordingly, even the information presented in this paper, as, indeed, any other statistical information published by the MOE, the Central Bureau of Statistics or any other Israeli or overseas body, is based on 60 percent real data and 40 percent statistical imputation (imputation being a statistical method by means of which the quantity of garbage manufactured in a particular authority is measured by comparison with another authority resembling it in certain criteria, such as size of jurisdiction, population, socio-economic level and so forth).

As an example of the pervasive uncertainty concerning garbage quantities in Israel, we may look at Central Bureau of Statistics’ publications regarding the quantities of garbage generated by the Jerusalem District, to which six local authorities belong (Jerusalem, Beit Shemesh, Abu Ghosh, Mate Yehuda, Mevasseret Zion, and Kiryat Yearim). Central Bureau of Statistics publications on the subject are presented in figure 1. In its *Statistical Abstract of Israel 1996*, the Central Bureau of Statistics reported that the Jerusalem District manufactured, in 1995, some 500,000 tons of garbage, with data being imputed for half the authorities in the district (three out of six). The *Statistical Abstract of Israel 1999* reported that the Jerusalem District had manufactured 674,639 tons; in 1998 it reported 612,347 tons, and in 1999 it reported only 347,683 tons. The big differences in garbage quantities manufactured from year to year in the Jerusalem District illustrate the contemptuous attitude of some local authorities and government agencies in Israel in all matters pertaining to the garbage issue. In addition, if we compare the quantities of garbage in the Jerusalem region to population size throughout the years as examined in figure 1, we will find that while the population increased by 7 percent, the Central Bureau of Statistics reported that the quantity of garbage in the district diminished by 22 percent.¹² Obviously, the amount of garbage was under-reported and the statistics were highly inaccurate.

This year, for the first time, the Central Bureau of Statistics obtained data on garbage manufactured in the city of Jerusalem, and figures for only two local authorities in the Jerusalem region had to be imputed. The figures indicate that in 2000 only 390,000 tons of garbage were manufactured in Jerusalem, 40 percent less than the quantity reported in 1997.

Figure 1



Source: Based on Central Bureau of Statistics, *Statistical Abstracts of Israel* 1997-2001.

Were the Local Authorities Always Responsible for Garbage Collection?

Negative. Under the British Mandate, the general concept regarding garbage was that the residents must make arrangements for the removal of the garbage they manufactured, while it was the job of the local authority to maintain supervision and enforce cleanliness. The People's Health Ordinance (1940) vested the local sanitation authority (town council or local council) with the powers to require that residents remove health hazards, including garbage of all kinds, and prevent hazards from coming about as a result of garbage accumulation.¹³ This ordinance positioned the local sanitation authority as the address to which residents could turn with regard to any notice requiring the removal of a health hazard. Likewise, the ordinance required the authority to serve notice requiring the removal of the health hazard on the person who had created it, rather than removing it itself. The ordinance provided that only if the authority failed to locate the person creating the health hazard, would it act to remove the hazard itself, and it was empowered to demand payment for such removal from the person involved, when found.

The state of Israel, when first established, altered the concept of responsibility for the handling of garbage. Similar to what took place in other sectors of the Israeli economy, Israel's centralist regime resolved to assume responsibility for this aspect of the citizen's life, too. The state decided that the responsibility for the collection and disposal of garbage would pass from the residents to the local authority. True to the zeitgeist, Israel legislated a number of laws designed to "regulate" the matter of sanitation for the inhabitants:

- In the Municipalities Ordinance (New Version), Israel established the sanitation, public health and well-being obligations and powers of the municipality. This ordinance provided that the municipality (rather than the citizens) must make arrangements for the removal of private garbage containers and for the sweeping and cleaning of the streets; the residents, in return, must pay special clean-up fees.¹⁴ This ordinance empowers the municipality to take steps for the

removal or prevention of any sanitation nuisance and for installing and maintaining garbage receptacles in public places so that garbage should not constitute a nuisance or a health hazard.

- In the Planning and Building Law (1965) the state determined that the set-up of garbage disposal sites was subject to the local zoning arrangements.¹⁵ The law was designed to ensure that land usage was planned in such a way that garbage disposal sites would only be built in open areas, remote from population concentrations.
- The Maintenance of Cleanliness Law (1984) marked the first budding of public awareness of the waste problem. The law threatens fines and levies against persons or companies dumping garbage in the public domain, but has no pretensions to outlining the proper manner of waste treatment.¹⁶
- In 1993, a “Recycling Law” was enacted, providing for the collection and removal of waste for recycling. Under this law, the local authorities and the minister of the environment were empowered to establish arrangements for the separation of waste at source.¹⁷

The issue of garbage in Israel was first seriously addressed in 1989, and that for two main reasons: first, the MOE was established in that year; and second, it was in 1989 that the government adopted a national garbage disposal plan, known as the National Outline Plan for Waste Removal (NOP 16), in the framework of the Planning and Building Law. It was in the early seventies that the plan first began to be outlined. But, as this was a plan for an overall, systemic examination of the theme of sanitation, calling for a number of statutory approvals, ratification was still a long way off. A number of health problems that had begun to emerge because of the proximity of the garbage dumps to population concentrations at the beginning of the seventies showed how necessary such a plan was. It aspired to bring about the closure of illegal waste disposal sites operating at low standards, while regulating the set-up and operation of a limited number of new sites, at high sanitary and ecological standards.¹⁸ In short order, it became apparent that NOP 16 provided no real response to the waste problem: Establishing new sites remained a cumbersome procedure; old, illegal sites continued in operation; and, at the same time, waste quantities were steadily increasing.

The government understood that as a result of its decision the costs to local authorities of handling waste would scale new heights, and it therefore allocated special budgets, commencing 1995, to help finance the costs of waste handling and interment for authorities that had been using the now-defunct Hiriya site.¹⁹ Assistance to local authorities would last five years, being scaled down by an annual 20 percent from the full amount. In 1998, direct aid amounted to \$15 million, divided among 80 local authorities.

In August 1998, after repeated struggles and much deliberation involving green organizations, the MOE, local authority heads and others, operations at Hiriya, Israel’s largest landfill, were discontinued. The Hiriya waste site was absorbing three thousand tons of waste daily but, in view of the palpable risk to the environment as well as to airplane flight safety, the government had resolved, in 1997, to put a stop to the interment of waste at this site.²⁰ Today, Hiriya operates as a transfer station where waste is compressed and sent to other sites.

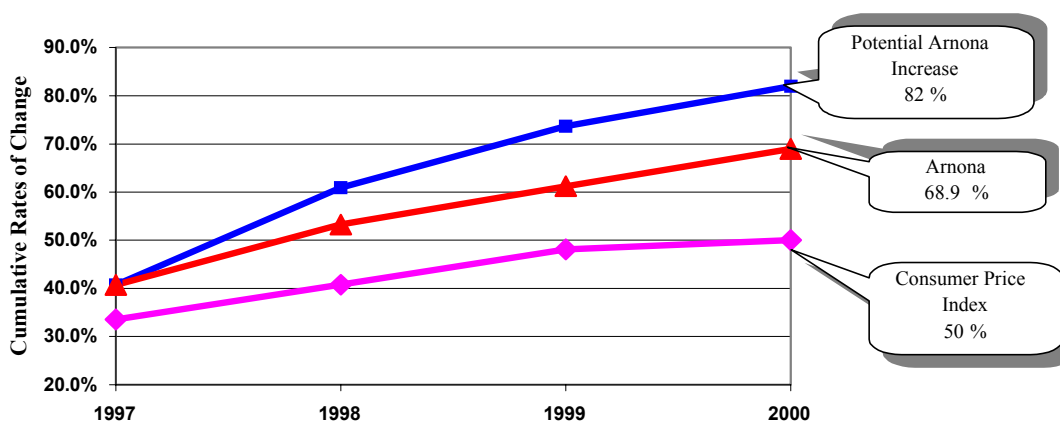
How Much Is this Costing Us?

Israel determined that payment for the municipal services provided by Israel's local authorities, including garbage collection services, would be collected from residents as part of their general municipal taxes ("arnona"). For urban communities, the power to collect such fees was anchored in the Municipalities Ordinance (New Version), and for local councils, in the Local Councils Orders A (1950) and B (1953).²¹ These fees constitute a tax. The High Court has ruled that the residents of a local authority are obliged to pay it, even if they are not satisfied with the standard of services provided for them by the local authority.²²

Until 1985, local authorities were unrestricted as to their power to raise municipal taxes in the areas under their jurisdiction. As of 1986, the Knesset established that any increase in arnona exceeding that provided by law, could only be made with the approval of the ministers of the interior and finance.²³ Generally speaking, the law provides that arnona rates will be linked to the Consumer Price Index. The Industrial and Commercial Economics Department of the Manufacturers Association conducted, in the period 1997-2000, an examination of arnona rates in local authorities compared to the rate of the rise in the Consumer Price Index. As shown in figure 2, the findings of that examination attested that the local authorities in Israel had raised the arnona, in those years, by 12.6 percent in real terms.²⁴

Figure 2

Cumulative Increase in Arnona and CPI (on the basis of 1994)



Source: Nir Kantor, economist at the Industrial and Commercial Economics Department of the Manufacturers Association of Israel, telephone interview with the author, June 12, 2001.

As stated, in addition to linking the arnona to the Consumer Price Index, local authorities were given another option for increasing it. Under the "Arrangements Law," the minister of finance and the minister of the interior must annually propose to the Knesset Finance Committee some option for further increasing arnona having regard to the deficits recorded by the various local authorities. The Knesset Finance Committee then either approves or rejects this proposal. Thereupon, the local authority has the option of putting a further arnona increase into effect. The

top line in figure 2 illustrates the potential rate of increase of arnona in the local authorities in Israel, utilized, according to the Manufacturers Association, by very many of them.²⁵

In addition to rate payments, the Ministry of the Interior and the Ministry of Finance grant the local authorities hundreds of millions dollars more annually as “municipal services support.” This support for local authorities by the government of Israel takes the form of budget balancing grants. The government funds the difference between the authority’s regular independent revenues and its regular budgeted expenses. In 2000, the state transferred more than \$850 million to 265 local authorities in Israel as budget balancing grants.²⁶ It should be noted that local authorities in Israel are directly funded by government welfare and education services; the object of the government’s “budget balancing grants” to the local authorities is to provide support for municipal services among which sanitation accounts for a very large slice. To sum up, the Israeli taxpayer pays local authorities for municipal services on two parallel levels: a direct tax, in the form of the municipal tax, and an indirect tax in the form of balancing grants to cover the local authorities’ deficits, themselves financed out of income tax and other taxes paid by Israeli citizens.

What Type of Garbage Do We Manufacture?

As stated, very few people in Israel pay attention to what becomes of the trash bag or the waste they generate in daily life, once they have deposited it in the local garbage bin. The following describes the process undergone by a trash bag from collection and storage to its final disposal.

Waste generated in Israel may be classified under three headings, depending on various types of treatment, since each class calls for a different, indeed a unique, treatment method. The first type consists of hazardous waste; waste of the kind that is given special handling from the collection and accumulation stage to the final disposal segment. Israel has just one treatment facility for hazardous waste, which is situated at Ramat Hovav. According to official data of the Ministry of Environment, only 50,000 tons of hazardous waste were evacuated to Ramat Hovav in 1998. A larger quantity of hazardous waste, over 78,0000 tons, was evacuated to unlicensed sites in various parts of the country.²⁷

The second type of solid waste is inert waste, scrap metal and building debris. This waste, too, is subject to special transport from the collection and accumulation segments to special inert-waste disposal sites. This *Policy Studies* concentrates on the third type of waste in Israel, namely urban waste. This includes four types of solid waste: domestic and commercial waste, industrial waste, materials for recycling and separation, and yard waste. Its treatment requires an extra segment, in addition to the two previous types reviewed. Urban waste is usually removed to a local transit station after being collected from the municipal authorities.²⁸

Generally speaking, there are two main reasons why a local authority will decide to set up or have recourse to a transit station: the first has to do with the distance between the refuse-collection point and the landfill to which the waste is removed. If the landfill site is remote it is not cost-effective for the authority to operate its own collection system (crew and driver) in the transportation stage. It is cheaper to rent or, in certain instances, to actually set up a transit station to move the refuse to the landfill. The second reason has to do with the type of receptacles used by the

authority. Even when the landfill is close by, municipal authorities that use containers prefer to resort to transit stations, since containers are usually emptied and evacuated at a certain frequency, rather than on the basis of the quantity of refuse in the container. Accordingly, authorities find it preferable to remove the refuse to transit stations rather than travel long distances with containers that may sometimes be empty. At the transit stations, the refuse is tipped into a large concrete pit. A tractor pulling a spiked iron chain then runs over the pit, breaking up the refuse and helping to compact it. Following this process, the refuse is again collected onto trucks with larger containers that move it to landfills in various parts of Israel. As distinct from other Western countries, which have a diverse range of solutions for solid waste such as recycling and reusing, Israel's solution for 90 percent of the waste generated in Israel over the course of a year is interment in a landfill.

What Private Companies Operate in the Trash Collection Market in Israel?

Israel's garbage collection market is controlled for the most part by the sanitation departments of the various municipal authorities. A report on the rationalization of sanitation services in local authorities, commissioned by the MOE, notes that "some 80 percent of the quantity of refuse that was reported is independently removed (by the authorities) and only some 20 percent by contractors. If and when an examination is conducted giving a breakdown by authorities, it transpires that more than 50 percent of authorities use contractors for refuse removal (in whole or in part)."²⁹

Thus, even though half of Israel's local authorities report that they make use of private contractors for refuse removal, the private sector is responsible for the removal of only 20 percent of the quantity of solid urban waste generated in Israel annually. Today, there are several dozen private companies and contractors collecting garbage, with the market being controlled, for the most part, by three companies: Tamam–Amnir, Deshe, and Chen Hamakom. We will now examine these companies:

- Integrated Recycling Industries – Amnir (Tamam–Amnir), is an Israeli public company in the waste management sector with a payroll of approximately five hundred employees. Two-thirds of the company's shares are held by a French company, a leader in the field of waste management, Onyx. Onyx belongs to the international Vivendi group.³⁰ The other third is held by American Israeli Paper Mills Ltd. Under the complete ownership of Tamam–Amnir are Yarab Landscape Services (1985) Ltd, and Amnir Industries & Environment Services Ltd., the two foremost companies dealing with the development and management of waste in Israel. In addition, Tamam–Amnir holds one-third of the shares of United Landfills Enterprises Ltd.

Tamam–Amnir says it is responsible for the treatment of more than 1.5 million tons of waste manufactured in Israel annually. Amnir and Yarab provide complete or partial waste treatment and removal services to thirty local authorities and councils. Operating by the BOT (Build, Operate, Transfer) method, the company set up ten transit stations and currently operates four in various parts of Israel.³¹ The company also owns the compost recycling plant in Afula, two landfills (Dudaim in Beer Sheba and Poriya in Tiberias), and a fleet of 250 garbage collection trucks operating in all parts of Israel.

- Deshe Environment Ltd. is a private company owned by Milgam Municipal Services (70 percent) and the Valenci family (30 percent).³² For about five years, the company has been operating full and partial treatment services for some forty municipalities, local council and institutions such as Israel Military Industries and the Ministry of Defense. The company's motor vehicle fleet numbers approximately 120 special-purpose vehicles, its sales turnover in 2000 stood at \$15.5 million, and it has a payroll of approximately four hundred employees.

- Chen Hamakom is a private company founded in 1990 by its current manager, David Franco. The company has been awarded both the ISO 9000 standard and the ISO 14001 standard – both by the Israel Standards Institute, attesting to the quality of its garbage treatment systems. It owns two transit stations for the absorption of refuse: one within the jurisdiction of the township of Dimona, serving the southern region, the other “Dudaei Ayalon,” located in the northern industrial zone of Lod. The company's motor vehicle fleet numbers approximately sixty-five, and the company has a payroll of approximately one hundred and fifty.

To sum up, the absence of precise data on garbage quantities in the areas of most local authorities in Israel may be said to be serving the purpose of the authorities, which is to maintain the status quo and continue controlling the collection of garbage in Israel, and not to allow the private sector to show its advantages in this field. As the above outline indicates, Israel has numerous private companies in the garbage collection sector. The three leading companies that we have reviewed are already providing a total or partial response to the garbage problem in a number of Israeli towns such as Beer Sheba, Ashdod, Ness Ziona and others. The next part of this study will show that for two local authorities in Israel, private companies in the garbage sector are cheaper, more efficient and better than local authority employees in all matters pertaining to the collection and removal of garbage.

Private vs. Public

Among waste industry professionals, there exists a sweeping consensus that as far as concerns the collection and removal of garbage in local authorities, the private sector is more efficient and cheaper than the public sector.

The *Ha'aretz* newspaper maintains that:

The main argument advanced by the authorities in favour of switching to [garbage] removal by contractors, is that the service is cheaper and more efficient....Environmental consultant Yitzhak Gil says the transition to contractor services also stems from the fact that the financial position of local authorities is becoming increasingly distressed, forcing them to rationalize. According to Gil, while the cost of waste collection in local authorities, on nationwide average, is estimated at \$80 per ton, the cost of removal by contractor comes to \$40 per ton.³³

In order to examine and illustrate the economic advantages of the private over the public sector in all aspects of urban waste, this segment will look at the costs of the labor components of the sanitation departments in two local authorities: Tel Aviv–Jaffa and Netanya. Given the similarity in the findings relating to these two authorities, we may state, as a generalization, that it is

not only in these authorities that money is being wasted; such waste is a feature probably held in common by most of Israel's local authorities. This conclusion was also reached by the MOE, which examined 115 local authorities, 45 percent of the total number in Israel:

The source of most of the problems in the inner-city routes are in the organization by the specific local authorities (such as managerial failures, budgetary limitations, information systems, lack of system control and oversight) but even more in the local labor agreements in place in most of the established cities, which significantly increase the cost of the largest expense regarding this service: wages.³⁴

Every city has its own unique features: its distance from a transit station, whether roads are narrow or broad, whether receptacles can be located in every apartment building, or whether containers or tanks are necessary for a group of buildings, and so forth. For these reasons, a comparison between two cities will not provide many clues as to the degree of efficiency of the sanitation departments in those cities. A comparison between the private and the public sector in one and the same city will give better results.

The cities of Tel Aviv–Jaffa and Netanya were chosen out of all Israel's local authorities for two reasons: first and foremost, they were chosen because these two towns employ both private contractors and local authority employees to collect and remove waste. A comparison can thus be drawn between the work performed by the local authorities and the private companies in a single city. In addition, these authorities possess a data bank concerning the quantities of garbage generated within their jurisdiction, as well as the costs of collecting and removing this urban waste. The reason why such data is kept is that the authorities transfer the refuse to transit stations, which weigh the quantities in every single truckload.

We will sketch for each authority the work of the municipal sanitation department and that of the contractors. Our analysis of the work of local authority employees and private sector employees will be performed on the basis of criteria such as the manpower employed in removing the garbage, capacity per truck, work hours logged by both trucks and employees, the number of trucks used to remove the garbage and so forth. The comparison will be based on figures for March 2001, since that month recorded neither strikes by the sanitation departments nor any public holidays on which local authority employees do not work; thus March 2001 consisted of 26 full working days.

The following analysis indicates that, were the private companies in the surveyed cities permitted to collect the garbage in all parts of the respective city, taxpayers in both cities would enjoy substantial savings. In Tel Aviv–Jaffa at least \$40 million per annum could be saved, and in Netanya, \$1.5 million per annum.

Tel Aviv–Jaffa

The Tel Aviv municipality is one of Israel's largest local authorities. Its jurisdiction covers an area of 51,000 dunam (12,750 acres), it has a population of 353,000, the municipality has a payroll of 7,300 employees, and businesses number (as of the end of 1998) 50,200.³⁵ In addition, about a million people enter into the city for purposes of work, entertainment and commerce every

day. As a result, the Tel Aviv–Jaffa jurisdiction manufactures, on average, 14 percent of Israel’s total solid waste in the course of a year. In 2000, for example, the city generated more than 423,000 tons of solid urban waste.³⁶

To take care of this very substantial proportion of Israel’s annual quantity of garbage, the Tel Aviv–Jaffa municipality maintains a quite sizeable sanitation division.

Manpower – the municipal sanitation division numbers 1,442 employees, accounting for 20 percent of the municipality’s entire staff. On its payroll are 1,012 department employees and 430 office workers.³⁷

Equipment – The town boasts garbage receptacles of various types and capacity, from 76-liter garbage cans to 30-cubic-meter containers.³⁸ In addition to the receptacles, in order to collect and remove the garbage from the town environs, the municipality has over the years acquired 209 different vehicles: compactors, mixed-waste containment vehicles, roll-on-roll-offs (vehicles for emptying mobile containers), sweepers, tenders, tractors, motor-scooters and cranes.³⁹

Facilities – the municipality operates and maintains two transit stations: one in Jaffa, located on Ben-Zvi Road on the corner of Shelavim, which takes in 48 tons daily, and one on Anilewicz Street, taking in 46 tons daily. Also, the city of Tel Aviv–Jaffa is a member of the “Dan Municipal Sanitation Union” together with six other local authorities in Gush Dan. The Dan Municipal Sanitation Union is the body currently operating the Hiriya transfer station and is in charge of the physical distribution of garbage from the Gush Dan region to the Dudaim interment site near Beer Sheba.

According to the planning and control manager of the municipal sanitation division, because of the special character of the city, the division operates around the clock, through the entire year (excepting on Yom Kippur). The frequency of garbage removal in the town, according to him, is not less than three times a week, and there are areas, mainly in the commercial and entertainment districts, where garbage is removed daily, while on the town’s principal axes, it may sometimes be removed twice daily.

In order to maintain a division of the size outlined, the ordinary budget of the sanitation department in the Tel Aviv–Jaffa municipality stood, in 2000, at \$86 million, one-ninth of the municipal expenses that year.⁴⁰ Another \$8.5 million was added to the division’s budget in 1999 with the approval of the Ministry of the Interior, in the framework of the municipality’s extraordinary budget.⁴¹

The Tel Aviv–Jaffa municipality is one of the authorities reporting that it engages both private contractors and municipal employees in removing its garbage. A brief examination of the figures for the garbage quantities removed from the city on a monthly basis shows that 96 percent of the city’s garbage is removed by sanitation division staff, and 4 percent by two private companies.⁴² This finding supports the conclusion that the quantity actually removed by private companies is significantly lower than would appear from the number of municipalities in which they operate, according to the local authorities’ own statements.

Private companies first began collecting Tel Aviv's garbage three years ago. In November 1997 the then mayor, Roni Milo, declared war on the municipality's sanitation division workers. Nettled by severe criticism of how dirty the town was, the mayor resolved that in order to improve Tel Aviv's appearance, and thus provide better service for residents, private companies should be hired to collect garbage.⁴³ Sanitation employees responded by declaring a general strike, which, lasting two weeks, caused damage estimated at more than \$2 million.⁴⁴ In the wake of the two-week strike, garbage stood piled up on the streets of Tel Aviv–Jaffa, forcing the mayor to reach a compromise with municipal workers. The result was an agreement to hire two contracting companies for four municipal districts and increase the division's own manpower establishment by another hundred employees.⁴⁵

The companies hired to collect garbage in those districts were Yarab Landscape Services Ltd. (the subsidiary of Tamam–Amnir), and Zebai. Yarab removes the garbage in the neighborhoods of Neve Avivim, Azorei Chen and Kiryat Shalom. A fourth district, Florentine, has its garbage removed by the Zebai company. In addition to removing these districts' garbage every day of the week, the companies also remove the trash heaps accumulating at commercial and entertainment hubs, and on the town's principal axes, on Saturdays and holidays. In consideration of these services, the municipality paid the private companies \$1.53 million in 1999.⁴⁶

At this point, in order to gain an initial indication of the economic advantages of using the private sector, a simple exercise in mathematics will suffice. If for collecting 4 percent of the city's garbage the companies charge \$1.53 million, then for the entire city they would collect \$38 million. That amount represents one-half of the municipal division's budget. In addition, one significant difference between the work of the sanitation division and that of the private companies must be stressed: their collection frequency. The Tel Aviv–Jaffa municipality required the contracting private companies to collect garbage from their assigned districts on a daily basis, a requirement it does not meet itself. The municipality's sanitation department collects garbage from most districts only three times a week. Accordingly, it seems reasonable to assume that if the private companies removed garbage at a frequency identical to that of the municipal division, they would offer an even lower price than they are charging today.

In order to understand why the sanitation budget of the Tel Aviv–Jaffa municipality is twice as large as it should be, we can look at a number of economic factors by which the private sector is distinguished from the public, regarding garbage collection in local authorities.

Output per Truck

As stated, the sanitation division of the Tel Aviv–Jaffa municipality maintains a fleet of 209 vehicles of various types and sizes, of which 72 are compactor trucks. They derive their name from the compacting device mounted on them. This device helps compact the garbage, which is then emptied onto the receptacles truck. In this way, the truck can collect a larger quantity of garbage in each round. To determine whether the municipal sanitation department really needs to maintain so many vehicles, we will examine the use the municipality makes of them, employing a basic element of economics, namely the efficient-allocation principle. The principle relates to how employees and

equipment should be allocated to various areas, according to the specific conditions of the area, the employees and the equipment, in order to attain an efficient distribution, ensuring minimum expense and maximum efficiency of both employees and equipment. We will see whether the sanitation division of the Tel Aviv–Jaffa municipality has arrived at this kind of efficient allocation of the equipment it purchased.

To ensure the collection of garbage from the city streets, the sanitation division divided Tel Aviv–Jaffa into five regions: Trans-Yarkon, North, Center, East and South. These regions were then subdivided into 16 neighborhood sanitation stations, in charge of the regular removal of garbage, the manual sweeping of streets and sidewalks, and the cleaning of the market places within their jurisdiction. For each neighborhood station, the division allocated equipment and employees to clean the areas. The allocation of equipment in the town’s various regions and neighborhoods was not based on the principles of efficient allocation. Because of the inefficient allocation of trucks, the Tel Aviv municipality maintains 18 (statistically: 18.3) more compactors than it needs in order to provide a response to the quantities of garbage generated within the confines of the city. This surplus translated into an estimated burden of \$14 million in 2000.

As stated, the Tel Aviv–Jaffa municipality uses contractors and local authority employees for garbage collection. The town’s contractors remove the garbage in four neighborhoods by means of compactor trucks alone. Therefore, the comparison in Tel Aviv will be conducted on the basis of the operations data for the compactors of the sanitation division as compared with that of the private contractors. Is the municipality making efficient use of the compactors it acquired? The comparison with Yarab will be based on certain criteria:

1. **Quantity of garbage per truck** – a garbage collection compactor working efficiently carries 60 percent of the volume of the body mounted on it. Yarab reports that for each effective run of a compactor truck to Hiriya, some 50 percent of the truck’s capacity ought to be full.
2. **Work days in March** – Of the 31 days in March, five were Saturdays. Also, we will assume that the vehicle needs to be repaired one day per month. Thus there were 25 working days for a garbage removal vehicle in March.
3. **Number of runs per day** – it takes an estimated half hour to one hour to drive from Tel Aviv–Jaffa to Hiriya, depending on the traffic volume and which area of the city the truck comes from. In addition, each garbage collection run of a compactor on the streets of Tel Aviv takes one to four hours. Accordingly, some trucks, both of the sanitation division and of the private companies, make up to four runs a day. Yarab reports that its small compactors, of 11, 13 and 14 cubic meters, carry out on average 2.5 runs a day, while the large, 19-cubic-meter vehicle makes an average of 2 runs per work day. In this model, these averages will constitute the index for the possible, and therefore efficient, number of runs per vehicle per workday.

Table 2 examines the degree of efficiency of compactor truck allocation by the sanitation division in the town’s streets. In respect to each type of vehicle, a calculation was made of the month’s standard (according to volume group), i.e., the monthly quantity of garbage that a group of trucks of identical volume ought to remove to Hiriya in 25 workdays. The monthly standard per

volume group reflects the efficient working of the compactor truck. Subsequently, a record was made of the actual quantity that the group removed from the city streets to Hiriya. The “Total Loss/Ton” column represents the difference between the actual tonnage brought by the group of trucks to the site and the tonnage it could have brought if trucks had been allocated in accordance with the garbage quantity that the truck was capable of removing in a single run, or, alternately, in the number of runs the truck was capable of making in a full workday.

As shown in table 2, in the first compactors group, with a container capacity of 11 cubic meters, the municipal sanitation division operates with excess efficiency. The group of trucks of this capacity brought 722 tons more than the quantity established as efficient for March 2001. This quantity translates into 2.1 trucks that the municipality saved by the efficient operation of the truck group of that capacity. However, in the other three groups, the municipal sanitation division does not operate efficiently. In the group of trucks with a capacity of 13 cubic meters, the Tel Aviv–Jaffa municipality maintains 32 trucks. By means of an efficient division of labor, the division could reduce by 10.8 the number of trucks maintained by the municipality. Six trucks could be subtracted from the group of trucks with a capacity of 14 cubic meters, while in the 19-cubic-meter truck group, 3.6 trucks could be subtracted from the municipality’s fleet of vehicles.

Table 2

Tel Aviv–Jaffa Municipality Compactor Truck Allocation Efficiency

Truck Capacity	Number of Trucks ^(a)	Total Capacity	Monthly Standard per Truck	Monthly Standard per Volume Group	Total Actual Tonnage ^(b)	Total Loss/Ton	Excess Trucks
11	6	66	343.75	2062.5	2784.82	-722.30	-2.1
13	32	416	406.25	1300.0	8625.97	4374.03	10.8
14	9	126	437.50	3937.5	1307.49	2630.01	6.0
19	11	209	475.00	5225.0	3536.80	1688.20	3.6

Sources:

a) Shlomo Ben Yishai, director of the Tel Aviv–Jaffa Municipality’s Planning and Control Department, interview with the author, January 24, 2001.

b) Hana Kotic, Dan Municipal Sanitation Union, interview with the author, April 5, 2001. Information is based on internal computerized data on weights.

In order to try to understand why the division works efficiently with small trucks (11 cubic meters) and not with larger ones, we asked the municipality if they work in different sections of the city or with different kinds of waste. The department says the 11-cube vehicles work all over the city, and collect waste on narrow streets too narrow for larger trucks.⁴⁷ We hypothesize therefore that this size truck is optimal for the routes planned in Tel Aviv. Wage accords (see below) require employees to be paid a full day’s wages for 3-4 hour routes, which may allow an amount of waste to be collected that fits the 11-cube vehicles, leaving all larger trucks operating inefficiently.

Table 2 shows that the inefficiency of the Tel Aviv–Jaffa municipal sanitation division in the allocation of trucks to the various parts of town caused the municipality to purchase and maintain 18.3 more compactor trucks than necessary to clean the town efficiently. Let us see what

this excess number of trucks cost Tel Aviv's taxpayers.

To estimate the financial damage, we need to take a number of factors into account.⁴⁸

1. The average lifetime of a compactor truck is seven years.
2. In order to capitalize the damage involved in the purchase and maintenance of 18.3 trucks by the Tel Aviv–Jaffa municipality, we will assume that the trucks were purchased in 2000, and that annual inflation is fixed at a level of 5 percent per annum.
3. The price of a compactor truck ranges from \$110,000 to \$150,000. Price is a function of the type of truck, the capacity of the container mounted on it, the number of trucks purchased by the local authority, and so forth. With a view to reaching a conservative estimate, we will assume that all the excess trucks cost only the minimum.
4. The price of one month's insurance for a compactor truck is \$430. Accordingly, annual insurance costs amount to \$5,200.
5. A compactor truck consumes fuel at a cost of \$480-\$960 per work month. But in order to arrive at a conservative estimate, we will base our calculations on the lower limit of \$480 per month.
6. The routine maintenance of a truck includes regular garage care. Such maintenance is estimated at between \$480 and \$1,450 per month, depending on the type of truck and its year of manufacture. We will assume that the cost of maintenance per truck is only \$480 per month.
7. Every vehicle in the state of Israel is obliged to undergo an annual test. The cost of the inspection fee varies between \$350 and \$550. We will assume that the annual inspection fee per truck is only \$350.
8. Another premise is that each truck is serviced by four workers: a driver and three laborers – two at the rear, and one laborer bringing out the receptacles from the houses to the curb. We will not draw any distinction between the pay of the drivers and that of the laborers, but will compute average pay per employee in the garbage collection department.⁴⁹

Table 3 itemizes the expenses of the Tel Aviv–Jaffa municipality in the purchase and maintenance of the excess trucks over their working life. It is assumed that the trucks were purchased in 2000, and for each subsequent year, a calculation is made of the municipality's expenses for their routine operation.

Based on these assumptions, we see that the financial damage involved in maintaining the 18.3 excess compactor trucks amounts to approximately \$14 million.

Table 3**Various Annual Costs in the Purchase and Maintenance of 18.3 Compactor Trucks in the Town of Tel Aviv–Jaffa (\$)**

	2000	2001	2002	2003	2004	2005	2006	Total
Cost of trucks ^(a)	2,013,000	-	-	-	-	-	-	
Insurance ^(b)	94,428	94,428	94,428	94,428	94,428	94,428	94,428	
Test	350	350	350	350	350	350	350	
Fuel ^(c)	105,408	105,408	105,408	105,408	105,408	105,408	105,408	
Wear and tear ^(d)	105,408	105,408	105,408	105,408	105,408	105,408	105,408	
Employees	1,609,080	1,609,080	1,609,080	1,609,080	1,609,080	1,609,080	1,609,080	
Total ^(e)	3,927,674	1,823,499	1,840,324	1,736,665	1,653,967	1,575,207	1,428,759	13,986,095

a) 2,013,000 = 18.3 x 110,000

b) 94,428 = 18.3 x 430 x 12

c) 105,408 = 18.3 x 430 x 12

d) Cost of repairs and upkeep: 18.3 x 480 x 12

e) Annual amounts are capitalized to the year 2000 on the basis of a fixed annual inflation rate of 5 percent per annum.

Manpower: The More People per Crew, the Fewer Work Hours per Day

The Tel Aviv–Jaffa municipal sanitation division employs two types of employees: employees of long standing, known as “the generation of the desert” (referring to Israel’s wandering in the desert, and implying that they have been around for a long time), and the more recently hired, known as “the seven-hour generation.” The desert generation consists of 450 employees constituting about 45 percent of divisional employees.⁵⁰ Both types of employees serve as both drivers and laborers in the sanitation division. The difference between them lies in the fact that, since they enjoy greater seniority in the sanitation division, the “desert generation” enjoys very substantial benefits. The daily work of the “desert generation” consists of just one compactor vehicle run, whereas the “seven-hour generation” must put in two runs. Thus the “desert generation” has only one “line,” one predefined route, for which they must empty all the garbage receptacles on a daily basis. Having accomplished this, they have completed their day’s work. The “seven-hour generation” has two such “lines” to run. A brief inspection of the number of vehicles in the Hiriya entry book attests that a compactor run lasts two to four hours.⁵¹ For those hours, the “desert generation” receives a full day’s pay. If required to do an additional run, a member of this group gets an additional day’s pay.⁵² The “seven-hour generation,” by contrast, puts in a seven-hour day, or two compactor truck runs.⁵³

The private contracting companies, in contrast to the sanitation division, place all employees (drivers and laborers) on an equal footing. Both drivers and laborers work the same number of hours per day. By and large, they put in eight-hour shifts, the day’s work being performed in two shifts.⁵⁴ To quantify the financial damage occasioned by the short workday of the city’s sanitation division, we may subtract the number of hours worked by sanitation division employees from the number of hours worked by the employees of a contracting company. In a

month with 25 work days, 1,012 municipal workers engaging in the provision of garbage collection services put in 67,450 hours less than the private company employees.⁵⁵

Tel Aviv–Jaffa sanitation workers not only work fewer hours than private company employees; they also have larger truck crews, consisting of one and sometimes two more laborers than the private-company crews. A crew is defined as the number of workers per garbage removal run. Under the terms of the agreement reached by city officials with the sanitation division employee’s committee, a removal crew consists of five to six persons – a driver and four or five laborers.⁵⁶ On the truck are the driver and three or four laborers, depending on the route they are to work. One other worker covers the route about an hour ahead of the truck, carrying garbage receptacles out of the houses and onto the curb. Private companies working different neighborhoods, by contrast, have a four-man crew only. On the truck are the driver and two laborers. Just fifteen minutes ahead of them, another laborer has brought out the receptacles from the houses.⁵⁷ Differences in work hours and crew size have a very large economic effect on the costs of the sanitation division, being a main reason why two-thirds of the departmental budget goes to salaries.⁵⁸

In brief, the large differences in output of both trucks and manpower, between the sanitation division employees and the private company employees, are the reason for the tremendous difference recorded in the cost of collection of a ton of garbage by the sanitation division and the cost of the same work when performed by private companies in Tel Aviv. In order to compute this cost, we will divide the total expenses of the sanitation division in 1999 by the quantity of garbage collected from the city’s streets in that year. The cost, so computed, comes to \$191 per ton.⁵⁹ In order to compute the collection cost per ton of garbage by the contracting companies working the city, we will employ a similar procedure: for collecting garbage in four urban neighborhoods on weekdays, as well as picking it up on Saturdays and holidays, the private companies charged \$15.3 million in 1999. According to the head of the Planning and Control Department of the sanitation division, the companies collect on average 1,500 tons per month from Tel Aviv’s streets.⁶⁰ Accordingly, they are responsible for collecting 18,000 tons annually. Therefore, the collection cost per ton of garbage in Tel Aviv–Jaffa by the private companies comes to \$86 per ton.⁶¹

We may now calculate the economic damage done in 1999 as a result of 96 percent of Tel Aviv’s garbage being collected by the sanitation division. If we multiply the quantity of garbage collected by the sanitation division by the difference in the collection cost of a ton of garbage by the municipality compared to the private companies, we will find that, in 1999, garbage collection services cost the Tel Aviv taxpayer at least \$40.14 million more than they should have.

Netanya

The town of Netanya is deemed a medium-size local authority in Israel. It has a population of 180,000 (58,823 households), and its jurisdiction encompasses an area of 28,000 dunams (7,000 acres).⁶² Netanya residents generate an annual 78,000 tons of domestic garbage, of which, in 2000, private companies collected more than 60 percent.⁶³

Shimon Bochnik, director of Netanya's Municipal Sanitation Division, maintains that: "Netanya's stumbling block is the sanitation division employees."⁶⁴ Under a series of agreements with these employees, the division is precluded from adopting economic rationalization measures. According to Bochnik, he would like to transfer garbage collection in other parts of the city to private contractors but, if he did so, there would be a general strike in the sanitation division and the whole city would be brought to a standstill. Bochnik argues the practical impossibility of dislodging the municipal sanitation workers. The solution, in his opinion, lies in a scaling down of the number of employees as they gradually retire, with no new employees meanwhile being hired. He reports that in the past five years, the division has taken on only four new employees.

To have the garbage removed from the city streets, the municipality both maintains its sanitation division and hires private contractors. The sanitation division numbers approximately seventy employees, as of 2000, of whom forty engage directly in garbage collection. In addition, the sanitation division has six compactor trucks operated by municipal employees in two daily shifts. In Netanya, as in Tel Aviv and other local authorities, garbage collection is based on the piecework method rather than on a particular number of hours. According to the sanitation division director, each local garbage collection run lasts up to three hours, whereupon the employee has completed his work for that day. In a situation similar to that in Tel Aviv-Jaffa, if an employee is asked to execute another collection run, he is rewarded with an extra day's pay.

Like half of Israel's local authorities, Netanya, too, reports the use of private companies to collect and remove urban garbage. In contrast to most local authorities, reports filed on the engagement of private contractors also provide genuinely significant information on the quantity of garbage they remove. Six private companies operate in Netanya's garbage collection and removal system. The garbage trucks of a contractor named Zvi Cohen are responsible for hauling away 25 percent of the city's garbage, Amnir removes 32 percent, and another contractor, by the name of Haim Tawig, removes 2.5 percent of local garbage.⁶⁵ For service to the Netanya municipality and residents, the private companies charge \$2.8 million a year. Again, similar to the analysis conducted in Tel Aviv-Jaffa, we find that if Netanya's city officials would permit private companies to collect all the town's garbage, they would charge at most \$4.7 million a year, considerably less than the current sanitation division budget, which totaled \$8.8 million in 1999.⁶⁶

In 1999, the pay of the seventy division employees amounted to \$3.94 million. A simple calculation proves that the average wage of a sanitation division employee in Netanya comes to \$4,694 per month (NIS 19,480 gross), or about three times the average national wage.⁶⁷

Similar to the analysis previously performed regarding the sanitation division of the Tel Aviv-Jaffa municipality, an analysis could be performed regarding the excess division manpower and equipment in Netanya, which burdens the taxpayers. But the director of the Netanya municipal sanitation division concurs with the aforesaid arguments and, in the year 2000, he had already composed an internal report of his own. The report draws a comparison between the various concerns in Netanya regarding garbage collection costs.

Table 4 shows that, in contrast to the foregoing analysis of the Tel Aviv-Jaffa sanitation division, the comparison here is based on the cost to the various contractors and to the sanitation

division of Netanya of removing a single garbage receptacle. The table indicates that, although the frequency of garbage removal is identical for all contractors and municipal employees, significant differences do exist. The city's private contractors are responsible for removing a diverse range of receptacles of various sizes. We will concentrate on the second column from the right. Here we see that a certain private company performs 13 removals per month, handling 174 carts of a 1,100-liter capacity. For removing each cart of such capacity, the contractor charges \$31.5. The rightmost column of the table shows that the city's sanitation division workers are responsible for removing 2,550 carts of identical capacity in the same frequency as the private company. But, in a departure from their previous custom, the sanitation division did not calculate the monthly price of removal of such a cart by the sanitation division. To calculate the price, all that needs to be done is to divide the total monthly cost by the quantity of receptacles removed by the municipality, in other words, $209,156/2,550$. On the basis of this computation, we find that the cost of removal of a 1,100-liter cart by the sanitation division is \$82, or \$50.5 more than charged by the private company working another Netanya neighborhood.

Table 4

Garbage Removal Costs in Netanya (\$)

	Private Contractor 1	Private Contractor 2	Private Contractor 3	Municipal Workers
Types of Receptacles	Carts of up to 110 liters	Carts of 240-360 liters	1,100-liter carts	1,100-liter carts
Quantity of Receptacles	8,118	2,012 + 13	174	2,550
Number of Removals per Receptacle	13 per month	13 per month on a daily basis	13 per month	13 per month
Monthly Removal Price	2.8	9.25	31.5	82*
Total Monthly Cost	22,749 excluding VAT	18,893 excluding VAT	5,492 excluding VAT	209,156 (no VAT)

Source: Sanitation Division plan for 2000, as reported by Shimon Bochnik, director of the Netanya Municipal Sanitation Division, in an interview with the author, March 25, 2001. The private contractor VAT payments are recredited at the end of the year so they are a "wash" (\$ = NIS 4.15).

* This figure does not appear in the original, as explained above.

To sum up, the excess economic burden occasioned by the activity of the Netanya sanitation division may be computed by multiplying the difference in the cost of removing a 1,100-liter cart, by the number of carts removed by the sanitation division. We thus find that the Netanya taxpayer could save more than \$1.5 million every year.

International Survey

Over the past twenty years, governments the world over have transferred responsibility for the provision of waste disposal services from local authorities to private companies. Many policymakers and government officials in various countries worldwide agree that there is no reason why governments should hold a monopoly in garbage removal. They realize that the private sector

is capable of providing better and cheaper service than the public sector, meaning local authority employees. In pursuance to this realization, sweeping reforms have been instituted regarding solid waste in countries such as the UK, Denmark and the United States, but not in Israel. We would do well to study the situation in these countries, in order to understand what changes are needed in Israel's waste industry and how they may be successfully instituted.⁶⁸

Table 5 presents select quantitative data regarding each of the four countries surveyed below.

Table 5

Quantitative Features of the United Kingdom, Denmark, United States and Israel

	UK ^(a)	Denmark ^(b)	United States	Israel ^(c)
Per capita product per annum (\$) (purchasing power parity, 2000) ^(d)	23,900	28,300	36,000	18,848 ^(e)
Population (millions, 2000) ^(f)	59.5	5.3	285.1	6.4
Annual percentage population growth	0.25 %	0.35%	0.9 % ^(g)	2.4 %
Quantity of solid waste per annum (million tons)	106	13 ^(h)	390	3.7
Average garbage quantity per capital per diem (kilogram) ⁽ⁱ⁾	1.534	1.223	2.03 ^(j)	1.69
Percentage annual increase of garbage	3%	0%	4%	5%
Private sector share of industry	35%	65%	69%	20% ^(k)

Sources:

a) Grant McPhee, Department of the Environment, Transport and Regions, letter to the author, May 25, 2001.

b) Denmark Waste Statistics:

http://mst.dk/udgiv/publications/2001/87-7944-381-8/html/indhold_eng.htm

c) Central Bureau of Statistics, *Statistical Abstract of Israel 1999* (Jerusalem: CBS, 1999)

d) www.oecd.org/publication/figures/2001/anglais/012_013_GDP.pdf

e) Central Bureau of Statistics, "Statistical Abstract of Israel 2001" (Central Bureau of Statistics, Jerusalem, 2001, draft), table no. 28.6. Data is for 1999. [Hebrew]

f) www.census.gov/cgi-bin/ipc/idbsum?cty=UK; www.census.gov/cgi-bin/ipc/idbsum?cty=DA; www.census.gov

g) www.census.gov/population/estimates/nation/intfile2-1.txt

h) Denmark imports waste as well.

i) 1 kilogram = 2.2046 pounds.

j) www.epa.gov/epaoswer/non-hw/muncpl/99charoc.pdf

k) Doron Lavi, *Rationalization of Sanitation Services in the Local Authorities: Summarizing Report* (Jerusalem: Ministry of the Environment, 2000), p. 48. [Hebrew]

The United States

In the United States, in terms of per capita GDP, the living standard is higher than that of Israel, but in a comparison of quantities of garbage per capita between the two countries, the U.S. citizen is found to generate only 2 kilograms daily, just 300 grams more than the Israeli citizen at a lower living standard. In 1999, U.S. residents "manufactured" 390 million tons of solid waste.⁶⁹ The waste industry employs approximately 365,000 persons, and its profits are estimated at over \$43 billion.⁷⁰ Like Israel, the United States, too, is characterized by the high growth rate of annual

waste quantities, at 4 percent annually. But considering the high standard of living in the United States (\$36,000 per capita GDP), it seems obvious that the high living standard, of which the manufacture of larger quantities of garbage is typical, can partly explain the high annual growth rate of garbage.

In the United States, no specific federal law addresses the subject of garbage collection; the matter is deemed one of local jurisdiction, and each state accordingly enacts laws and regulations for its local waste industry. Accordingly, like in Israel, some states have chosen to set up bodies and institutions to handle waste disposal for the inhabitants, while others have elected to hire the services of private companies to deal with it for them. In all, the public sector in the United States is responsible for only 31 percent of the total waste collection market, while the private sector takes the lion's share, 69 percent.⁷¹ The privatization of the U.S. waste collection market was influenced by three major factors: first, cost saving; second, the wish to use state-of-the-art technologies in the waste industry; and third, the wish to reduce the risks involved in the provision of waste management services.⁷² Also boosting the urge to privatize the garbage industry were a number of comprehensive studies on the subject, conducted in the late seventies. One famous study was conducted by Savas (1977), proving that in towns with a population of more than 50,000 inhabitants, authorities could cut 29-37 percent of their expenses by privatizing garbage collection services.⁷³

A second study looked at 120 Canadian cities and found that up to 50 percent of costs could be saved by issuing tenders for municipal services.⁷⁴ A third study showed possible savings of 28-42 percent in 20 California cities.⁷⁵ A fourth study found that Phoenix saved \$30 million since it began privatizing services in 1979.⁷⁶

Today, the waste industry is controlled, for the most part, by three large companies providing comprehensive management of waste for various states in the U.S. By way of illustration, we would note that the profits of Waste Management Inc., the largest company, amounted in 1999 to \$13.1 billion. The company handles, directly or through its wholly owned subsidiaries, all existing aspects of waste management in most states of the United States. The company operates a garbage collection system in municipal authorities, owns transit stations and landfills, as well as numerous recycling and treatment plants.

Denmark

Denmark's population is about the same as that of Israel, with 5.3 million inhabitants. Denmark views waste like any other commodity. The waste generated by Danish citizens is supplemented by waste imports by the local waste industry. The Danish government imposed on local authorities the obligation of coming up, every four years, with a short-term, four-year plan, and a long-term, twelve-year plan, for the management of the waste system. Also, the central government in Denmark allowed its local authorities the option of either setting up independent garbage collection systems, in which a number of local authorities would jointly operate a garbage collection cooperative; or they could turn over garbage collection to a private company. In Denmark, garbage collection from households is financed, in most local authorities, by a special garbage collection fee of fixed amount, and not as part of overall municipal taxes. Today, garbage

collection from residents' homes is implemented both by the local authority and by private companies, with the great majority of the business sector electing to hire the services of private companies.⁷⁷ Thirty-five companies providing services to 65 percent of the municipal authorities control the Danish garbage market.

In a study conducted in 2001, it was found that in 65 percent of the cases examined, the price was lowered when tenders were issued. In 63 percent of the local authorities, the privatization saved up to \$58,775; in 15 percent between \$58,775 and \$117,547; in 15 percent between \$117,547 and \$352,641; in 6 percent more than \$352,641.⁷⁸ In addition, in 82 percent of the cases the companies winning the tenders met the standards set, and in 30 percent of the cases improvements in service were recorded.⁷⁹

United Kingdom

The reform undergone by the waste disposal industry in the UK can serve as a good example of the kind of reform Israel should institute in the sector. The UK generates 105 million tons of solid urban waste annually. Accordingly, the "trash industry" in the UK is estimated at \$5 billion annually, of which \$2.7 billion belongs to the waste collection sector, while the remaining \$2.3 billion is for the final disposal of waste.⁸⁰

Until 1988, similar to the current situation in Israel, local authorities in the UK were solely responsible for garbage collection from the residents. In 1988, the British Parliament came to perceive the economic and qualitative advantages the private sector possessed, as compared to the public sector, as far as municipal services were concerned. Elected British officials decided to enact a special law requiring British local authorities to issue tenders for all "blue collar" services within their jurisdiction, including garbage collection. A direct result of this decision was the rationalization of this sector, as the private sector rapidly integrated into it.⁸¹

Historically speaking, the collection and removal of waste by the private sector in the UK evolved mainly out of economic considerations in large projects such as the rehabilitation of quarries. In these projects, the construction industry, which rehabilitated the quarries on a nationwide basis, had to dispose of a great deal of construction rubble, for which purpose it preferred to hire the services of the low-priced, rapid and efficient private sector. In addition, British citizens, too, had to contend with strikes on the part of trade unions opposed to privatization, which fixed the development of the sector at a particular level and adversely affected its efficiency. The administration's solution was to permit commercial cooperation between the public and the private sectors, reflected in public sector participation in waste industry tenders issued in the UK.

Thanks to the obligatory issue of competitive tenders in the collection and removal of garbage, as part of the 1988 reform, the private sector's market share in this industry increased. In 1991, private companies held 14.6 percent of the collection and sweeping (street cleaning) market in local authorities. By 1998, ten years after the sector underwent reform, 35 percent of the waste collection industry belonged to the private sector, with two private companies from France, namely SITA and Onyx, controlling 40 percent of the private market.⁸² Today, for every garbage collection and removal tender issued by the local authorities, an average of thirteen (the number ranges from

six to twenty) firms apply for the tender documents. Highly perfected competition may thus be said to exist in the market, ensuring low prices and efficient service.⁸³

Israel

Compared to the other countries surveyed, Israel's situation is dismal. While the country has a small number of inhabitants, each of them generated about 1.69 kilograms of garbage daily in 1999, and all figures indicate an increase in the coming years. The increase in per capita GDP since the end of the nineties has produced a situation in which living standards in Israel today are only slightly lower than in most Western countries. But the quantity of garbage in Israel has increased by a high rate compared to those countries, five percent per annum. Israel's government is responsible for the fact that the private sector in the garbage industry collections only 20 percent of the waste generated within the jurisdiction of the local authorities. As a result, and as we have proved in this paper, Israeli citizens must content themselves with defective service for which they pay an exorbitant price. In addition, the high growth rate of the Israeli population, at 2.4 percent per annum, is several times that of other countries. This ensures that the solid waste problem of Israel's citizens will be exacerbated in years to come. Accordingly, elected officials should re-examine and reassess the question of the handling of garbage in Israel. They should learn from global developments in this matter, in order to act in the best possible way on behalf of Israel's citizens.

Summary and Recommendations

In this paper, we have examined the waste disposal industry in Israel and in a number of other Western countries. We have reviewed the ways in which Israel copes with its annually increasing quantities of garbage, taking into account the country's unique features. The aforesaid indicates that the solution adopted by the state, namely that of garbage being collected by local authorities in Israel, results in the prodigious waste of the taxpayers' money. Our review of the economics involved has proved that for the two Israeli local authorities that were examined, namely Tel Aviv–Jaffa and Netanya, the budgets of the sanitation divisions could be cut in half, enabling a substantial reduction in the arnona paid by city residents.

The most important measure necessary to bring about the rationalization of the waste disposal system in the local authorities in Israel is to open up the market to competition. This study has shown that there are many private companies in Israel that are able to provide — and are, in many cases, actually providing — a better and cheaper response in a number of local authorities to the garbage collection problem than that provided by local authority employees. Officially, every local authority is free to hire a private company to collect its garbage. In practice, as we have seen in the case of the Tel Aviv–Jaffa municipality, the local authority employee unions (“worker committees”) and the national labor union, the Histadrut, prevent municipal leaders from moving in this direction.

We therefore propose opening up the market to competition by means of several steps, some of them short-term and others long-term.

In the immediate term:

1. The municipal authorities' obligation to report quantities of garbage to the Central Bureau of Statistics should be enforced.
2. General arnona assessments should provide details of the total payment for the collection and removal of garbage in the local authority. This would bring the subject of waste into the awareness of the public, and it could also become a factor in a citizen's deciding where he will live.
3. Arnona bills should also state what purpose garbage payments are being put to, so that they will be used only for the collection and removal of garbage and not for other municipal services, as happens today in various local authorities in Israel.

In the long term:

Similar to laws in effect in the other countries surveyed in this paper, the Israeli parliament can require heads of local authorities to fully privatize garbage collection services. Until legislation is completed, it would be worthwhile for local authorities to be prohibited from hiring new employees for their sanitation divisions, and they should refrain from granting tenure to temporary employees. At the same time, the Knesset should consider amending the Municipalities Ordinance in such a way as to require all local authorities to publish tenders inviting bids for garbage collection services. The tender should be based on considerations of efficiency and quality. That is to say, bidding in the tender should be subject to compliance with a certain standard of service, with the successful bidder being the one offering the lowest bid.

Naturally, local authority employees may oppose the implementation of any measure that will impinge on their control of the garbage collection market. For that reason, sanitation divisions should also be permitted to take part in such tenders. The sanitation divisions should be given a period of grace to be agreed prior to the publication of the tender, perhaps 90 days, in which to become more efficient and following which they will be able to participate in tenders.

Promoting competition in the waste disposal sector in the local authorities will necessarily result in a reduction of the budgets allocated annually to garbage collection. The tremendous savings in taxpayers' money can and should be translated into a decrease in the local tax paid by residents.

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Notes

¹ Rachely Merchav, "The Garbage Mountain Reaches the Museum," *Adam, Teva VaDin Environmental Protection Quarterly* 35, December 1999. [Hebrew]

² <http://cbs.gov.il/shnaton51/st02a.pdf>

³ "Recycling Solid Waste in Israel: Data and Goals," *Adam, Teva VaDin*, Winter 2001, p. 6. [Hebrew]

⁴ Ministry of the Environment, *Towards Lasting Development: First Documents* (Jerusalem: Ministry of the Environment, 1998), p. 32. [Hebrew]

⁵ Interment is liable to cause pollution because of the creation of leachate (fluids escaping from the waste), the emission of greenhouse gases and toxic, explosive gases and may also cause the spread of diseases by means of animal life feeding off the buried garbage.

⁶ Central Bureau of Statistics, "Statistical Abstract of Israel 2001" (Central Bureau of Statistics, Jerusalem, 2001, draft), table no. 27.14. [Hebrew]

⁷ Ibid.

⁸ Dr. Ruth Sheshinsky, director of the Division for Environment and Agriculture in the Central Bureau of Statistics, interview with the author, June 6, 2001.

⁹ Ilan Nissim, director of the Division for Solid Waste, Ministry of the Environment, interview with the author, March 4, 2001.

¹⁰ Ayal Artzi, Adam Teva VaDin organization, interview with the author, February 15, 2001.

¹¹ Ibid.

¹² Central Bureau of Statistics, *Statistical Abstract of Israel 1997* (Jerusalem: CBS, 1997), table 1.18; *Statistical Abstract of Israel 1998*, table 1.18; *Statistical Abstract of Israel 1999*, table 1.24; *Statistical Abstract of Israel 2000*, table 1.21. Population in 1996 from Sheshinsky, interview.

¹³ Government of Palestine, *Ordinances, Regulations, Orders and Announcements*, vol. 1 (Jerusalem: Government Printer, 1940), p. 210. [Hebrew]

¹⁴ *Laws of the Government of Israel*, in *Gazettes: Code of Laws* (Jerusalem: Government Printer, 1964), p. 231. [Hebrew]

¹⁵ Ibid, p. 317.

¹⁶ *Laws of the Government of Israel*, in *Gazettes: Code of Law* (Jerusalem: Government Printer 1984), p. 142. [Hebrew]

¹⁷ Ministry of the Environment, *Environmental Quality in Israel: Annual Report 1998/22* (Jerusalem: Ministry of the Environment, 1999), p. 46. [Hebrew]

¹⁸ Ibid., p. 43.

¹⁹ Ministry of the Environment, *Environmental Quality in Israel*, p. 38, noting a government decision of June 6, 1993, to promote the treatment of solid waste, clause 7. [Hebrew]

²⁰ Hiriya was a garbage dump rather than a properly regulated landfill. Therefore, the main risk to the environment was that of groundwater pollution. In addition, the site was located on the take-off and landing paths of Ben-Gurion, Israel's largest airport. Large fowl, circling above Hiriya, constituted a real danger to airplanes and to their many passengers. In view of these and other risks, the Israeli government resolved to stop depositing garbage there.

²¹ *Laws of the Government of Israel, Municipalities Ordinance (New Version)*, ch. 14, Arnona.

²² *Yediot Aharonot*, July 17, 2001.

²³ HCJ 170/87, *David Asulin et al. v. the Mayor of Kiryat Gat et al.*, in *Piskei Din* 42 (1) 678. [Hebrew] This ruling was issued as a precedent and basis for the future.

²⁴ $1.126 = 1.168/1.5$ to calculate real increase in arnona.

²⁵ Nir Kantor, economist at the Industrial and Commercial Economics Department of the Manufacturers Association of Israel, telephone interview with the author, June 12, 2001.

²⁶ Amit Lang, in charge of the Ministry of the Environment and the Ministry of the Interior at the Budget Division of the Ministry of Finance, telephone interview with the author, June 3, 2001.

²⁷ Ministry of the Environment, *Environmental Quality in Israel*, p. 102.

²⁸ Some municipal authority areas have transit stations in order to reduce the high physical distribution costs involved in moving the refuse to the nearest landfill.

²⁹ Doron Lavi, *Rationalization of Sanitation Services in the Local Authorities: Summarizing Report* (Jerusalem: Ministry of the Environment, 2000), p. 48 [Hebrew].

³⁰ Sharon Alon, general manager of Yarab Landscape Services, interview with the author, January 28 2001.

³¹ Build, Operate, Transfer: an agreement whereby a company builds the site and operates it for a number of years, after which it transfers responsibility for operating the site to another concern, which will generally be the company or concern at whose request the site was built.

³² Gershon Nave, business manager of Deshe Environment, interview with the author, February 5, 2001.

³³ *Ha'aretz*, March 27, 2001.

³⁴ Lavi, *Rationalization*, p. 19.

³⁵ Shlomo Ben Yishai, director of the Planning and Control Department of the Sanitation Division of the Tel Aviv Municipality, interview with the author, January 24, 2001.

³⁶ Ibid.

³⁷ Tel Aviv–Jaffa Municipality, “The Sanitation Division’s Situation, January 1999” (Tel Aviv–Jaffa Municipality, January 1999, memorandum). [Hebrew]

³⁸ The following is the exact number of receptacles as noted in Tel Aviv–Jaffa Municipality, “Sanitation Division Situation”: 2000 black garbage bins (76 liters), 30,000 small carts (240-360 liters), 3,547 carts (1,100 liters) 741 mobile containers (6 cubic meters) and 585 containers (of 10 – 30 cubic meters).

³⁹ The following is the precise number of vehicles at the disposal of the municipality, based on Yishai, interview: 72 compactors (vehicles with an absorption capacity of between 4 and 19 cubic meters), 7 mixed waste vehicles, 17 roll-on roll-off trucks (with a capacity of 16 – 30 cubic meters), 4 roll-on roll-off trucks with a capacity of up to 10 cubic meters, 14 roll-on roll-off trucks with a capacity of 6 cubic meters, 2 sweepers (4-6 cubic meters), 6 sidewalk sweepers, 12 tenders with a tip-up facility of 1.5 cubic meters, 14 reconnaissance tenders, 9 administrative vehicles, 7 pest-extermination vehicles, 34 supervision motorcycles, and the municipality also leases two cranes.

⁴⁰ The Tel Aviv–Jaffa Municipal Center for Socio-Economic Research, *Statistical Yearbook 39* (Tel Aviv–Jaffa: Center for Socio-Economic Research, 1999), p. 497. [Hebrew] (dollar-shekel exchange rate: \$1 = NIS 4.15).

⁴¹ Shlomo Ben Yishai, interview with the author, June 18, 2001. The extraordinary budget consists of expenses added in the course of the year, which at the time the budget was drafted, were unknown and unanticipated.

⁴² Danny Sternberg, engineer for the Dan Municipal Sanitation Union, interview with the author, May 5 2001.

⁴³ *Globes*, December 2, 1997.

⁴⁴ *Globes*, December 11 1997.

⁴⁵ Ibid.

⁴⁶ Ben Yishai, interview, June 18 2001.

⁴⁷ Ibid.

⁴⁸ Eilay Livny, economist at Tamam–Amnir, interview with the author, April 12, 2001. The figures in points 1-7 are based on the financial statements of Yarab Landscape services.

⁴⁹ Per worker payroll cost is based on the actual average annual pay of the 362 employees physically engaged in garbage collection in the Tel Aviv–Jaffa Sanitation Division.

⁵⁰ Ben Yishai, interview, June 18, 2001. The figures are correct for July 2000.

⁵¹ Hana Kotic, Dan Municipal Sanitation Union, interview with the author, April 5, 2001.

⁵² Ben Yishai, interview, June 3, 2001.

⁵³ Avi Stienmich, deputy director general of the Tel Aviv–Jaffa Municipality and chairman of its technical committee, letter to the director general of the Tel Aviv–Jaffa Municipality, Meir Doron, dated July 7, 1997. [Hebrew]

⁵⁴ Robin Shalom, director of the Tamam–Amnir marketing department, interview with the author, April 12, 2001.

⁵⁵ The calculation is based on four hours' difference between public and private employees, multiplied by the number of public employees: $450 \times 1 + 4 \times (1012 - 450) = 2,698$; $2,698 \times 35 = 67,450$.

⁵⁶ Stienmich, letter.

⁵⁷ Shalom, interview.

⁵⁸ Ben Yishai, interview, June 18, 2001.

⁵⁹ It is important to note that neither the payments to private companies, nor the quantity collected by them, are included in the computation.

⁶⁰ Ben Yishai, interview, June 18, 2001.

⁶¹ Calculation for private truck in Tel Aviv: $1,530,000/18,000 = \$86$.

⁶² Shimon Bochnick, director of the Netanya Municipal Sanitation Division, interview with the author, March 24, 2001.

⁶³ Ibid.

⁶⁴ Ibid.

⁶⁵ The computation was based on the quantities of garbage brought by the contracting companies and the Netanya Municipality to the Sharon transit station in 2000.

⁶⁶ Shimon Bochnick, interview with the author, March 25, 2001. The figures were taken from the Netanya municipal budget for 2001, as provided during the interview.

⁶⁷ Ibid.

⁶⁸ For purposes of comparison, several countries will show the benefits of privatization.

⁶⁹ Nora Goldstein, "The State of Garbage in America," *Biocycle Magazine*, vol. 41, no. 4 (April 2000), pp. 32-39.

⁷⁰ R.W. Beck, *Size of the United States Solid Waste Industry* (Alexandria, Va.: Chartwell Information Publishers, 2001), p. ES-3.

⁷¹ Ibid, p. 20.

⁷² L. Scarlett and M. Sloan, *Solid Waste Management – A Guide for Competitive Contracting for Collection*, How-to Guide, no. 16 (Los Angeles: Reason Foundation, 1996).

⁷³ E. S. Savas, *The Organization and Efficiency of Solid Waste Collection* (Lexington, Mass: Lexington Books, 1977).

⁷⁴ J. C. McDavid, P. Richards and B. Doughton, “Privatization of Residential Solid Waste Collection in Richmond, British Columbia” (School of Public Administration, University of Victoria, report, n.d.).

⁷⁵ B. Stevens, *Comparative Study of Municipal Service Delivery* (New York: Ecodata, Inc., February, 1984).

⁷⁶ www.goldwaterinstitute.org/publication/azia.htm

⁷⁷ Rene Butik, Danish Ministry of the Environment and Energy Center for Information, letter to the author, March 21, 2001.

⁷⁸ Nana Winkler, Waste Center Denmark, letter to the author, August 5, 2001. Based on July 2000 exchange rate: Danish crown = USD 0.117547.

⁷⁹ Ibid.

⁸⁰ Ophira Ayalon, “Overseas Survey: Waste Treatment Policy” (Ministry of the Environment, Jerusalem, 1998, unpublished report), quoted in Lavi, *Rationalization*.

⁸¹ Ibid.

⁸² Grant McPhee, Department of the Environment, Transport and Regions, letter to the author, May 25, 2001.

⁸³ McPhee, letter to the author, June 6, 2001.

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