WEST BANK/GAZA

FEASIBILITY STUDY FOR THE KHADOURY TECHNOLOGY DEVELOPMENT CENTER AT TULKAREM

FINAL REPORT

USAID Contract No. 294-C-00-98-00110-00

Prepared

February 2000

for the

United States Agency for International Development

and the

Palestinian Industrial Estates and Free Zones Authority

by

The Services Group
2300 Clarendon Boulevard 1110
Arlington, VA 22201
USA

Table of Contents

ANNEX VOLUME

Tables and Figures

Executive Summary

1. Introduction

This USAID-funded study tests the financial and economic feasibility of the proposed Khadoury Technology Development Center (KTDC), a science and technology park to be located in Tulkarem, West Bank. The KTDC falls under the broader Palestinian industrial estate development initiative, which is administered by the Palestinian Industrial Estates and Free Zones Authority (PIEFZA).

2. Rationale and Approach

The KTDC is not envisioned as a simple office park development that offers space and services to an existing industry cluster. The Palestinian economy is not sufficiently developed or technology-intensive to warrant that kind of real estate-driven project. Instead, the KTDC is seen as an opportunity for focused public and private investment that can help to deepen West Bank/Gaza's technology and human resources base, support entrepreneurial development, attract investment, and stimulate private sector-oriented cross-border cooperation.

The challenge in designing a KTDC that is appropriate to the Palestinian economy lies in identifying a mix of activities that take advantage of West Bank/Gaza's human resources base and in avoiding an undue emphasis on high-technology manufacturing that has few supporting structures in the local economy. Low-wage, mass-production activities are similarly inappropriate for West Bank/Gaza. Relatively low-cost, educated, and productive labor in a social context that values educational achievement define the opportunities available for technological development in West Bank/Gaza.

The Palestinian Authority has not yet begun to formulate an integrated technology policy. One of the attractive features of science and technology parks in developing countries is that they can be implemented more quickly than national reforms, and can serve as a test bed for those national reforms. The developing country technology park is thus not a substitute for overall economic liberalization and technology promotion, but can serve both as a technology development "experiment" within the broader national economy and as a geographic focus around which technology-based companies, training institutions, and research facilities can converge. The objective for establishing the KTDC is to develop the site as a catalyst for higher-tech development that will eventually spill beyond the physical confines of the site.

Similar technology park-based development initiatives have been undertaken in over 60 countries around the world. While these parks differ widely in their individual attributes, successful parks adapt to their educational, technological, and economic context in terms of:

- Clear, focused, and limited objectives
- Tailored size and attractive physical environment
- Ownership and management structures based on objectives
- Thematically targeted industries and tenants
- Links to universities and technology bases
- Incentive systems designed around the needs of tenants
- High quality/low cost infrastructure, facilities, and services

Successful technology parks that follow these criteria are able to generate significant benefits for both host economies and tenant companies. Host economies are able to accelerate technological development, grow new economic clusters, generate employment and export earnings, enhance business efficiency, and strengthen the contribution of the university system to economic development. Tenant companies in turn gain access to a nucleus of technology, are able to collaborate with a range of partner companies, lower costs of shared services, and access economies of scale in sourcing products, services, and human resources.

Successful technology parks that offer these benefits are not static developments, but rather help their host economy move along an economic development trajectory. As technology parks employ more skilled workers, develop more advanced infrastructure, and host more sophisticated firms, those benefits spill into the broader host economy.

3. The Technology Context

The KTDC is being considered at a time when the knowledge-based economy is threatening to widen the development gap between rich and poor countries. Countries and regions with strong knowledge bases and the capacity to innovate generate new productive activity from within. They also attract additional technology-based enterprises and workers from outside, which provides further resources and impetus for improvements in schools and universities. This poses a real challenge for West Bank/Gaza, which neighbors a wealthy, developed economy, yet is under-performing economically and lacks basic "knowledge inputs" and technological infrastructure.

While this trend poses a real challenge for West Bank/Gaza's economic development, it is important to realize that appropriate technology policies can help to overcome a country's technological disadvantages. Two good illustrations of underdeveloped economies that merged as technology leaders through strategic and sustained government initiative are Israel and Singapore.

Israel has placed a tremendous emphasis on advanced educational and scientific research since 1948, largely in response to a relative lack of natural resources. While much of this R&D spending was defense-related in the beginning, R&D spending subsequently shifted increasingly into civilian projects. Israel was able to leapfrog from a largely agrarian economy to one of the world's technology leaders by pursuing three broad technology strategies:

- Facilitating R&D through public research funding, technology tax incentives, and bilateral R&D cooperation with developed countries.
- Translating technological innovation into marketable products and services through incubation, science parks, and linkages between academia and the private sector
- Technology-driven human resources development initiatives and manpower development programs

Singapore has similarly developed from a small, underdeveloped country to a world technology leader through an aggressive and sustained technology development program. Today, some fifteen percent of Singapore's GNP is invested in R&D. This successful development was based on two broad technology strategies:

- Facilitating R&D through public funding, research centers, workforce and infrastructure development programs, venture capital funding, patenting support services, and professional networking fora
- Exploiting information technology by developing a national IT masterplan, high-speed fiber optic communications hub, and education and re-training initiatives

In both the Israeli and Singaporean cases, success came from concerted activity across many areas of policy. Similarly, in West Bank/Gaza, the KTDC cannot be the only innovative strategy. Its development must be linked with the strengthening of K-12 education, improvements in the post-secondary education system, creation of appropriate intellectual property laws, efforts to repatriate talented Palestinians from abroad, the availability of funds for R&D and new enterprise development, and more. The KTDC can, however, serve as a technological impetus and as a demonstration project that incorporates different elements of the new knowledge economy.

4. The Human Resources Context

West Bank/Gaza's ability to carve out a niche in the knowledge economy depends heavily on available human resources, and on the systems and institutions that can upgrade the human resources base over time. This is difficult to achieve in a situation where the existing educational system is under an increasing strain from increasing student enrolments. Teachers who are insufficiently prepared and supported for a technology-driven economy exacerbate this situation.

As a result, Palestinian students lack problem-solving skills and exposure to technology career paths. In the higher education system, a strong cultural preference for academic over vocational training, and a lack of applied learning lead to graduates who are not well prepared to enter the technology labor market. That market is at present characterized by low technology utilization and inadequate labor market information systems that could provide feedback to the educational system.

Fortunately, most of these existing weaknesses are recognized, and a number of recent reforms have been introduced to address them. These reform efforts include additional IT-related training programs, and a renewed emphasis on integrating the education system more closely with the needs of the private sector.

Little reliable data exists on the actual technology-related human resources base available in West Bank/Gaza today. TSG estimates place the number of IT professionals available in the labor market today at around 375. The current supply of skilled IT workers is estimated at 250, and the number of hardware technicians at about 200. However, with additional training, West Bank/Gaza should be able to supply up to 1,600 IT professionals and up to 4,600 IT support workers.

5. The Economic Context

In addition to these technology- and human resources-specific issues, the design and development of the KTDC is also strongly influenced by the broader economic and investment environment in West Bank/Gaza. While some of these issues are well-known, broader economic structures and policies also have very specific impacts on the proposed KTDC. For example, investment incentives may not be equally valuable for garment manufacturers and R&D laboratories; trade barriers have different implications for food processors and telemarketers; and tax treatment of a wholly-owned packaging subsidiary may be quite different from that of a three-way software joint venture. The aspects of the Palestinian economy that have the greatest impact on the KTDC are:

- Labor mobility. The system of internal and external closures imposed on West Bank/Gaza and the stringent control on movements across the green line threaten the ability of potential investors to take advantage of the KTDC. While information technology is becoming borderless, the KTDC still requires access of supervisory personnel to the site, and travel by employees to locations on both sides of the green line for on-the-job training.

- Trade in goods. While the KTDC's main focus will probably be on technology services, some trade in goods will originate in the KTDC as well. Again, closures and high non-tariff-barriers faced by firms located in West Bank/Gaza threaten the viability of these activities.

- Investment regime. Investors in West Bank/Gaza face changing commercial law, overlapping regulatory requirements, difficult access to land, and an uncertain security environment. The KTDC can offer investors significant advantages in this are, including one-stop shopping, different siting options, and a central security interface.

- Taxation. While West Bank/Gaza offers investors investment incentives in the form of tax holidays, these holidays do not currently benefit investors who are taxed on a global basis in their home jurisdictions. These incentives will be competitive only if West Bank/Gaza concludes double taxation agreements that contain tax sparing provisions that would allow investors to credit holidays against taxes charged in their home jurisdiction.

- Intellectual property protection. Prevailing intellectual property legislation is insufficient in West Bank/Gaza. Even if new draft legislation is passed in a WIPO and TRIPS-compliant fashion, investors will require a robust regulatory and implementing framework that applies the new laws effectively and transparently.

6. Existing Conditions at Khadoury, Tulkarem

The physical location that has been identified for the KTDC is a 20-hectare plot of land located on the green line, east of the municipality of Tulkarem. The location is proximate to Israel's main Tel Aviv/Haifa high-technology corridor. Because the site is located within a well-developed urban area, the infrastructure to the site is relatively good. The strategic location of the site at the green line and close to the existing border crossing to Israel means that most of the infrastructural connections between Israel and the West Bank for this area pass through the site. The main infrastructure-related issues at the site are:

- Inadequate electricity supply capacity to meet demand in excess of current municipal consumption in Tulkarem

- Telecommunications infrastructure is being upgraded, but current pricing policies may be incompatible with the KTDC

- While Tulkarem enjoys a relatively good water supply, the well on the site itself is likely unsuitable for human consumption

- Different options for wastewater treatment in Tulkarem are currently being evaluated by a German consulting company

- The site enjoys good road access links to both West Bank/Gaza and Israel


ZONE C
KHADOURI TECHNICAL COLLEGE
ISRAEL
ZONE C
D.C.O
ISRAELI INDUSTRIAL ZONE
TULKARM
KHADOURY TECHNICAL
DEVELOPMENT CENTER
KTDC SITE - EXISTING USES
TSG
The Services Group
FIRST OPTION

The KTDC site represents an important cultural resource that is associated with education and technology. The site contains old buildings and equipment that evidence this heritage. They should be protected to enhance the KTDC's visual and aesthetic appeal.

The site's existing ownership structure is conducive to KTDC development. With the exception of the area currently being used by the District Coordination Office (DCO), which is designated Area C, the site is completely within Area A. This means that it can be developed within the existing PA planning framework, without approval by the Israeli Authorities. The main planning issues that need to be addressed at the site are:

- Accommodation of diverse land uses in a small area
- Preservation of a collegial campus atmosphere
- Phased development to accommodate some existing uses
- Balancing site access and security issues
- Difficult infrastructure planning in an uncertain environment
- Balancing industrial and educational development needs

7. Positioning the KTDC: Competitive Benchmarking

While proximity to the Israeli high-tech corridor is a major factor in making the KTDC possible, the development is expected to grow into a larger technology platform that will play a regional and, eventually, international role in technology-based industries. In order to understand how the KTDC can develop its regional role over time, it is instructive to compare it to related developments in countries such as Israel, Turkey, the United Arab Emirates, Egypt, and Jordan. West Bank/Gaza's comparative positioning vis-à-vis these comparator locations includes:

- Labor costs. While West Bank/Gaza has a significant labor cost advantage over high-cost locations such as Israel, the United Arab Emirates, and Turkey, Jordan and Egypt are very cost-competitive. Especially in terms of entry-level programmers, the KTDC will not be able to compete with these low-cost locations. The KTDC's strengths will have to be built on high-quality innovation (the "Israeli model") rather than bulk, commodity-type services (the "Indian model").

- Investment environment. West Bank/Gaza's new flat 20 percent corporate income tax compares favorably with regional comparator locations. While the Palestinian incentive system is generally competitive at the national level, technology-intensive investors do not benefit from the kinds of R&D incentives available in some of the comparator countries.

- Infrastructure. While the KTDC's electricity rates depend on required infrastructure improvements, an indicative kWh price charged in the Tulkarem municipality leaves West Bank/Gaza with the highest electricity rates in the comparator sample. Telecommunications charges for local and overseas long distance calls are relatively competitive, but regional telephone calls and international high-speed leased line connections remain extremely expensive. Lowering the KTDC's telecommunications costs (and improving service quality) will likely require limited deregulation of the KTDC's telecommunications infrastructure.

- Transportation. Sea and air freight charges for Palestinian exporters are significantly more expensive than those faced by Israeli exports, due to a variety of security inspections, handling fees, and NTBs. Even so, exporters in the KTDC will retain some cost advantages over Turkey and the United Arab Emirates.

Comparative Data for Regional Technology-Based Investment Locations

	Khadoury TDC West Bank/Gaza	Matam & Atidim Technology Parks Israel	Marmara & Aegean Technoparks Turkey	Jebel Ali Freeport UAE	Amman REACH Initiative Jordan	Sinai Technology Valley Egypt
Salary (US$/month): IT Technician	$ 300	$ 1,150	$ 1,250	$ 655	$ 290	$ 275
Salary (US$/month): Programmer	$ 1,250	$ 3,500	$ 2,110	$ 3,600	$ 325	$ 350
Salary (US$/month): Software Engineer	$ 1,250	$ 4,500	$ 1,750	$ 1,900	$ 725	$ 950
Corporate Tax Rate	20%	36%	30%	0%	35%	40%
Repatriation of Profits and Capital	Unrestricted	Unrestricted	Unrestricted	Unrestricted	Unrestricted	Unrestricted
Foreign Exchange Control	Exempt	Exempt	Exempt	Exempt	Exempt	Exempt
Incentives	Tax exemption for 7 years, reduced rate of 10% for 8 to 20 years, depending on project capital	Tax exemption for 2 years, additional tax benefits	Aegean: 100% exemption Marmara: exemptions negotiable	Not applicable	2-year tax holiday	Tax exemption up to 20 years, free land and infrastructure

	Khadoury TDC West Bank/Gaza	Matam & Atidim Technology Parks Israel	Marmara & Aegean Technoparks Turkey	Jebel Ali Freeport UAE	Amman REACH Initiative Jordan	Sinai Technology Valley Egypt
Grants for R&D Projects	None*	Grants (to 66% of approved expenses)	Soft loans and tax deductions	None	None	For government-funded projects
Electricity tariffs (US$/kWh)	$ 0.090*	$ 0.036	$ 0.070	$ 0.050	$ 0.048	$ 0.073
IDD to New York (US$)	$ 0.15*	$ 0.18	$ 0.72-0.89	$ 0.82-1.26	$ 0.75-1.75	$ 1.75-2.40
High Speed ISDN – 64kbps (US$ per month)	$ 4,000	$ 200	$ 1,500-2,000	$ 4,300	$ 1,700	n/a
Land Lease Rates (US$ /r m^2 / year)	$ 4.20	$ 1.50-2.50	$ 2.00-6.30	$ 2.75-5.45	$ 2.15	$ 3.50
SFB rent (US$ / m^{2} / year)	$ 42.00	$ 5.50-13.50	$ 4.00-8.50	$ 58.00-64.00	$ 17.00-21.50	$ 6.00
Office rent (US$ / m^{2} / year)	$ 59.00	$ 20-45	$ 13.50	$ 30	$ 70	n/a

Source: Compiled by The Services Group *Data provided for generic West Bank location. KTDC costs may differ.

8. Potential Demand for the KTDC

The many advantages outlined in the preceding sections make the KTDC a promising location for the development of an export-oriented IT industry. The following sections present the findings of the market assessment and demand projections for the KTDC.

Methodology for Market Assessment

The projected demand for KTDC facilities is based on a comprehensive evaluation of potential technology-oriented industries. The initial list of technology sectors that were selected for further analysis is the result of several factors, including:

- Current industry activity in the region, identifying those activities that display an upward growth trend in West Bank/Gaza and/or Israel, recent inward investment activity, and/or possible industrial linkages with West Bank/Gaza- or Israel-based industries; and

- International investment trends in similar technology parks and TDC projects around the world and within the region.

The list was further validated by discussions with local industries for expansion into horizontal and vertical linkages to other industries. Private sector, industry-specific input has provided the necessary insight in factors that most significantly contribute to location decision making, both in general and within a technology park environment. This has allowed the team to determine industries for which the KTDC appears to be a promising investment location.

The initial list of industry sectors selected for further analysis included:

- Software development, including software design and engineering, programming, testing, conversion and Arabization, and maintenance;

- IT services, including call centers, data conversion and other back office activities, and other IT services, such as consulting, e-commerce, enterprise resource planning, and web design;

- Consumer electronics and electrical appliances; and

- Education and training.

The next step in the analysis was to validate the feasibility of locating the selected industries or specific industry activities at the KTDC. The analysis included, for each industry sector, a "matching" of the "demand profile" for specific site attributes – such as labor requirements, telecommunications, and utilities – with the KTDC's various attributes.

The primary factors determining the potential for specific activities within each industry sector are the availability and cost of required labor. Throughout the course of this study, TSG consulted numerous individual, organizations, and other relevant studies regarding the skills level in West Bank/Gaza. TSG findings indicate that while West Bank/Gaza has a growing supply of graduates, both at the university and college levels, within the relevant disciplines (including software programmer, electronic and electrical engineers, and hardware and software technicians) few have attained the level of expertise required for the more sophisticated activities within the selected industry sectors, such as software and hardware product design and engineering. There is overwhelming consensus that local graduates possess strong theoretical training, but lack practical training and experience.

Therefore, at least in the initial stages of development, it can be expected that investment would most likely be in those activities requiring a lower degree of expertise. On the other hand, West Bank/Gaza must compete with a number of lower wage locations - including India, China, and the Caribbean. As labor costs typically account for a significant proportion of operating costs in these labor-intensive industries, in the short run, the KTDC is more likely to attract investment in activities that are competitively priced or unique to the region, based on its proximity to the Israeli and Arab-speaking markets rather than bulk, commodity-type activities. In the longer run, new training opportunities and growing industry experience will favor the development of higher-skilled niche activities, such as product design and engineering.

The following table provides a list of specific activities within each sector that most closely match the KTDC's existing location attributes, as well as prospects for long-term development.

Results of Industry Demand Profile Analysis

Industry Sector	Activities in Short-term Years 1 to 10	Activities in Long-term Years 11 to 20
Software Development	▪ Coding ▪ Conversion ▪ Maintenance	▪ Design and engineering ▪ Coding ▪ Conversion ▪ Maintenance
Call Centers	▪ Inbound Telemarketing ▪ Help Desk	▪ Inbound Telemarketing ▪ Help Desk
Data Conversion	▪ Alphanumeric Conversion ▪ Vector Conversion ▪ Other Activities	▪ Alphanumeric Conversion ▪ Vector Conversion ▪ Other Activities
Other IT Services	▪ Enterprise Resource Planning ▪ Network Design & Installations ▪ Web Design ▪ E-Commerce	▪ Enterprise Resource Planning ▪ Network Design & Installations ▪ Web Design ▪ E-Commerce
Electronics/ Electrical Appliances	▪ Manufacturing ▪ Precision assembly	▪ Design and engineering ▪ Manufacturing ▪ Precision assembly
On-Site Training	▪ Computer language and system certification programs ▪ Business development programs	▪ Computer language and system certification programs ▪ Business development programs

Potential Sources of Demand

Based on TSG findings, it is envisioned that the KTDC will attract investments primarily from Israeli companies and U.S. and European multinationals already with a presence in Israel, as a complement to the neighboring Haifa-Herzlya high-tech corridor. However, Palestinian companies will play a significant role, as the majority of Israeli and multinational companies indicated that they would prefer to have their Palestinian partners manage the day-to-day operations of any joint ventures or other partnership agreements. In addition, the technology incubator at the KTDC is likely to attract mainly Palestinian entrepreneurs. The KTDC is unlikely to attract a significant degree of investment from the Arabic-speaking region, as few indigenous IT companies have attained the level of capacity required to expand "abroad" and most are relatively inward looking, with output fulfilling local market requirements and little destined for export. The Arabic-speaking region offers itself, instead, as a growing market for Israeli and multinational enterprises.

Following is a breakdown, industry by industry, of the potential sources of investment in the KTDC:

Software Development. It is envisioned that software development will be the primary focus of the KTDC, both in the short-term and in the long-term.

- *Israel-based companies interested in "outsourcing" programming activities (including coding, maintenance and conversion) to meet manpower shortages*. Israel's manpower gap for software development was estimated at 2,500 in 1997, a gap that is expected to grow in the short-term. Such shortages are not only pushing salaries higher, but can also lead to a potential loss of competitiveness as key positions go unfilled. Given the local complexities involved in importing the required labor, Israel-based companies are beginning to turn to offshore investment and outsourcing to meet its manpower needs. The KTDC, given its proximity to Israel's technology corridor and the relative supply of computer science graduates, can provide an opportunity for Israeli and Israel-based multinationals to meet their manpower needs, though joint ventures and/or sub-contracting arrangements with Palestinian firms.

  Based on the level of existing software development skills and the level of industry experience in West Bank/Gaza, in the short-term such partnerships are expected to focus on programming and other coding of business and database management applications, niche markets in which the Palestinian sector has established experience. In the longer run, as the local skills base matures and gains the requisite expertise, opportunities will emerge for partnerships in more sophisticated activities, including software product design and engineering.

- *Israel-based or multinational companies interested in producing Arabized or other localized packaged software for the regional market*. As mentioned above, the Arabic software market has been increasing in importance over the last several years, reaching more than US$1.2 billion in 1997, a small but growing market for software producers. Over the past several years, a number of software houses have introduced Arabic-language based applications, including IBM, Microsoft, Oracle, Apple, and Borland International. The KTDC can provide a platform from which such companies can produce Arabized or other localized packaged software for the Arabic-speaking market, particularly Israeli companies, who have been limited in their ability to penetrate Arab markets due to ongoing trade embargoes.

- *Local Palestinian entrepreneurs.* In addition to playing a significant role in partnership with Israeli and multinational investments into the KTDC, local software developers would be attracted to the KTDC's incubator program, which could provide them with the required financial (venture capital) and technical support (including assistance in business management and marketing), key factors for which existing industry has indicated a growing need if local entrepreneurs are to improve their competitive standing. In the short-term, it is likely that their activities will be a continuation of the local industry's existing activities: customized database management systems (banking/financial, medical/health, government administrative systems), business applications, and turnkey solutions for PA and regional financial institutions.

Call Centers. Call center and help desk services are a growing industry worldwide, generating US$150 billion in 1998. The primary centers for call center activity are in the United States, Ireland, United Kingdom, and Canada. While many call centers serve their clients' Middle Eastern customers through their European call centers, as the insurance, banking, credit card, and information services industries grow in the Middle East, the demand for telesales, customer service, and technical help desks is increasing. TSG industry surveys in the U.S. and Israel indicate the potential for establishing call center and help desk service centers in West Bank/Gaza to service this growing market, provided the required telecommunications infrastructure and pricing is in place.

Data Conversion. Data and vector conversion, as well as other back office activities, are promising activities for KTDC investment. While local industry is at a relatively nascent stage, the growing need for such services within West Bank/Gaza, particularly by the PA, is likely to be the prime driver of investment in the short-term. In the medium- to long-term, as the industry becomes more established and the regional market for such services grows, the KTDC will have the potential to attract investments from the U.S. and/or Europe. In addition, local companies are likely to expand their services to include more complex digitization and database management activities.

<u>Other IT Services</u>. In terms of other IT services – including web design, e-commerce, enterprise resource planning, and network design and installations – it is expected that the majority of investment will come from local entrepreneurs, who would service the local and, perhaps, Israeli market. While there is some potential to export such services, a survey of the some of the largest markets (outside the U.S.) for such services indicates that few of these services are provided across borders, with the majority of domestic demand supplied by local companies.

<u>Consumer Electronics and Electrical Appliances</u>. The worldwide consumer electronics and electrical appliance industry is dominated by manufacturers in Europe and Asia and the United States. They are likewise the leading suppliers to the Middle East market. A TSG survey of recent investment trends in the Middle East region indicates that many of these manufacturers are setting up "point-of-sale" manufacturing plants to service the regional market. While the Israeli electronics sector is oriented toward military applications, aerospace and satellite communications, the consumer electronics, civilian telecommunications equipment, and household appliance sector provide substantial potential for either joint ventures or sub-contracting arrangements for "offshore" manufacturing. Given the supply of relatively low-cost, qualified labor in West Bank/Gaza – combined with preferential access to the Israeli, Egyptian, and Jordanian markets – the KTDC can provide a competitive environment for manufacturers to expand their role in the region.

In addition to investment in manufacturing activities, there is also potential for the KTDC to attract investment in after-sales repair and maintenance services for the regional market. Growing sales into the region will drive the need for authorized service centers – through either direct investments by manufacturers or sub-contracting/licensing agreements with third party vendors. Based on current trends in the region, the latter option appears to provide greater potential as most repair services in the region are conducted by authorized third party vendors rather than directly by the manufacturers.

While this sector is promising in terms of investment, as well as employment generation, the role of such activities should be limited at the KTDC, given the low-tech nature of many manufacturing operations and suitability of alternative industrial sites in the region. However, the presence of a consumer electronics or telecommunications equipment plant (versus household appliances) can play a positive role in the KTDC's development, providing opportunities to Khadoury students for hands-on industry experience. In addition, their presence can provide the basis for higher-tech activities, such as product design and pilot manufacturing, as local skills and experience develop over time.

On-Site Training. While it is envisioned that the public sector will play a strong role in establishing a training center at the KTDC, there is also potential to attract private-sector investment in training services, such as computer language/system certification and business development programs. While several local companies have begun offering training programs, both authorized and unauthorized, growing interest of local graduates in the IT sector has produced a shortfall in the supply of such programs. TSG industry surveys indicate a strong interest by Israeli and multinational third party training providers to establish training programs in the West Bank. With the projected growth in the IT sector at the KTDC will be a concomitant growth in demand for, and interest in supplying, certification and business programs.

KTDC Development and Projected Demand

While the previous sections outlined the projected activities and sources of investment in the KTDC, it is expected that their composition in the KTDC's development will change over time. The experience of other technology parks in developing countries – including India and the Caribbean – demonstrate the evolution of industry, from the production of lower-technology products to higher-technology products, from a low-cost investment opportunity to a high-quality investment opportunity. For instance, the Hsinchu Science-based Industrial Park in Taiwan, in a period of 17 years, evolved from a center for production (mostly hardware and electronics) to an R&D center. By 1997, Hsinchu Park firms were spending 5.4 percent of their sales revenues on R&D, compared to an average of 1 percent for other firms in Taiwan.

It is expected that the KTDC will follow a similar development trajectory, moving from basic IT services in the initial stages of development to more design- and engineering-oriented activities within 10 to 15 years as local skills and industry expertise develop. The KTDC will move from being a low-cost alternative for Israeli firms to an integrated extension of the growing Haifa-Herzlya technology corridor. The projected development of KTDC industry over time provides the basis for establishing the demand for KTDC facilities (office, manufacturing, and training space).

- *Phase 1 (Years 1 to 5)*. In the first phase of development, it is projected that investment will be dominated by basic software development activities and IT services, as well as consumer electronics assembly and repair services. Call center activities, given the low level of existing demand, is expected to emerge more strongly in the second phase of development as regional conditions become more conducive to industry development. Investment will mostly be sourced from Israeli and multinational investors, though many in partnership with local Palestinian companies. Other local entrepreneurs are projected to locate at the KTDC once an initial cluster of Israeli and multinationals have established there. Local entrepreneurs will remain relatively inward-looking. While Israeli and multinational ventures would establish themselves in regular office space, local entrepreneurs, would be likely to locate in either the KTDC incubator program or shared office space, depending on needs, "upgrading" as they grow and gain experience.

- *Phase 2 (Years 6 to 10)*. During the second phase of development, there will be little change in the composition of industry activities, with the exception of the entrance of call center activities. In addition, local entrepreneurs are likely to become outward-looking, as their capacity to market to the region grows. It will up to the KTDC's management to ensure that the integrity of the park remains intact, limiting the entrance of electronics assembly and repair services. The average size of investment is expected to grow over time, across all IT industry sectors, as existing enterprises expand, and more ambitious projects follow on the heels of the initial tenants, both impacting the demand for various KTDC facilities, as incubator tenants "graduate" and local entrepreneurs upgrade their facilities.

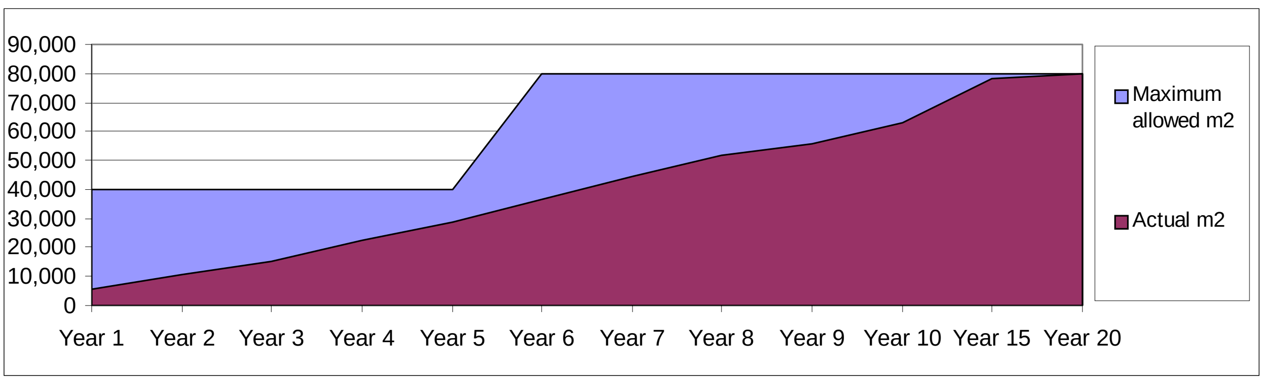
- *Phase 3 (Years 11 to 20)*. During the next ten years of the KTDC's development, the composition of industry will begin to change as local industry gains industry experience, providing the opportunity to move from lower-cost basic services to higher-quality product design and engineering, in both the software and electronics sectors. IT services – including call centers, data entry, and other IT services – will continue to grow as the demand for their services increases. The third phase of development will see a gradual "leveling-off" of investment, as the KTDC nears full capacity.

The following demand projections for the KTDC are based on the market assessment, as well as empirical evidence of growth patterns in leading technology parks around the world.

Based on worldwide best practices in technology park and industrial estate development, the KTDC should be developed in stages, in alignment with growth in expected demand for park facilities. Given the projected industry growth over time in the KTDC, the KTDC should be developed in two stages. Half of the 20-hectare site should be developed initially, which would accommodate the space requirements of industry in the first five years of its operations. The remaining 10 hectares of land should be developed after year five in order to accommodate the second and third phases of investment demand.

The figure below depicts the upper limit of developable floorspace in each phase of the KTDC's development, as well as the projected uptake of space over time based on the market assessment. The maximum allowable floorspace for the KTDC is based on a floor area ratio of 0.40, in accordance with worldwide experience in successful technology park development.

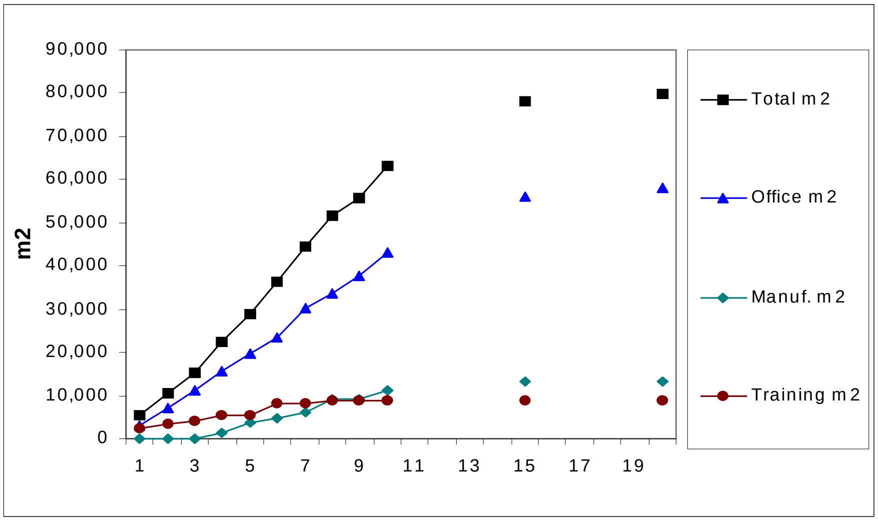
KTDC Floorspace Uptake Projections



Notes:
Actual m2 = Floorspace developed to meet actual demand by tenants
Uptake percentage = Developed floorspace in each category as a percentage of maximum allowed m2 in each phase of development
Maximum allowed m2 = Upper limit of developable floorspace in each phase, based on a floor area ratio of 0.4, phase I development of 10 ha and phase II development of full 20 ha site

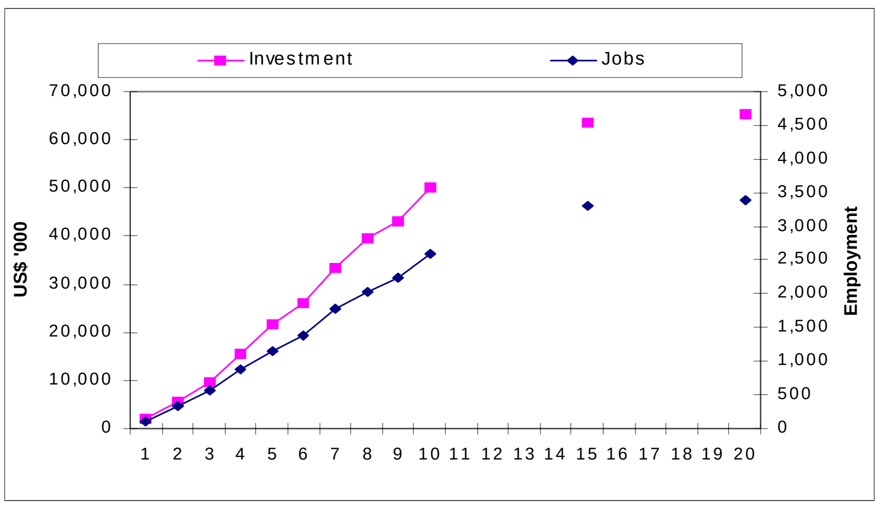
The following figure depicts the projected uptake of space for each type of KTDC facility (office space, manufacturing space, and training facilities).

KTDC Space Uptake Projections, by Facility Type



The figure below depicts the projected growth in investment and employment at the KTDC over a 20-year period, based on estimates derived from the market assessment. Investment into the KTDC is expected to grow at a relatively fast pace in the first ten years of operations, with investment averaging US$ 5 million per year, after which it is expected to slow down and eventually level-off as the park reaches full capacity.

KTDC Investment and Employment Projections



9. KTDC Product Definition: Policies and Institutions

The KTDC is thus a composite of physical, legal/regulatory, and institutional systems. This composite KTDC “product” offers institutional systems. This composite KTDC “product” offers potential developers and tenants a unique and attractive investment location that consists of both modern facilities and an innovative enabling environment. This identify of the KTDC as an investment location “product” that is aimed at meeting very specific industry demand niches is central to the success of the project.

Investment Policies

Some form of investment incentives are almost always a feature of technology parks and technology centers. These technology-oriented investment locations are generally seen as initiatives with strong public policy components aimed at achieving public goals (economic diversification, technology transfer, human resources development, technology diffusion, etc.) that warrant public investment to capture public benefits. Specific investment policies that can help to ensure the success of the KTDC include:

- <u>Land-related</u>: The main mechanism for land-based subsidization is the valuation of the KTDC land that is currently owned by the PA, and the mark-up on the cost of that land as it is released to the developer. In addition, some reduced rental rates can be offered in multi-tenant workspace facilities.

- <u>Infrastructure/service related</u>: The most important infrastructure incentive that can be provided to KTDC tenants consists of 1) a state-of-the-art fiber optic telecommunications backbone within the KTDC, 2) access to deregulated low-cost, high-speed telecommunications services, and 3) modern, reliable utilities connections.

- <u>Worker-related</u>: The main training “subsidy” will consist of university training held by Palestinian universities at the KTDC training facility. In addition, the KTDC will provide subsidized human resources placement services through the labor market information system.

- <u>Tax incentives</u>: The KTDC is designed to fall under the national tax regime. The only tax incentive applicable to the KTDC will be national investment incentives and the additional incentives available under the industrial estates regime.

- Regulatory relief: KTDC tenants will benefit from one-stop investment and regulatory approvals, in coordination with PIEFZA.

Human Resources

If the KTDC is to develop successfully over time, it must play an active part in developing West Bank/Gaza's technological skills base. These human resources development activities will be centered around a modern and well-equipped training and conferencing facility that serves both KTDC tenants and the broader Palestinian economy. This training center will attract IT experts to the area, answer questions about employment needs and educational opportunities, fill gaps in the provision of IT education and training, serve as an incentive to attract IT related businesses, and serve as a significant resource to the industry as it grows. The Center will accommodate five main types of activities:

1. Targeted and certified educational training for employees in IT occupations

- Deliver or support direct for training new employees, either on-site or at the company
- Offer vendors a central location for certified training
- Provide a central location for distance learning and a library of available courses and programs
- Offer seminars and workshops in new technologies
- Fill gaps by offering courses not available in universities

2. Management education in use of IT for e-commerce

- Provide advanced internet access site for teaching Palestinian businesses about e-commerce and e-business
- Provide a location for teleconferencing

3. Upgrading skills of teachers and faculty (IT instructors)

- Hold in-service training workshops in latest technologies and pedagogies
- Inform instructors about innovations, curriculum, and materials available elsewhere

4. Serving as source of labor market information and human resource development-related R&D

- Conduct IT-related R&D such as, i.e. instructional methods, skill needs surveys, students assessment instruments, curriculum development, and new program design

- Collect and disseminate labor market information that can be used by industry, students, and school guidance counselors, and instructors
- Create a means for using the expertise of faculty and students for IT-related and -sponsored R&D, similar to Germany's college-based Fraunhofer Institutes

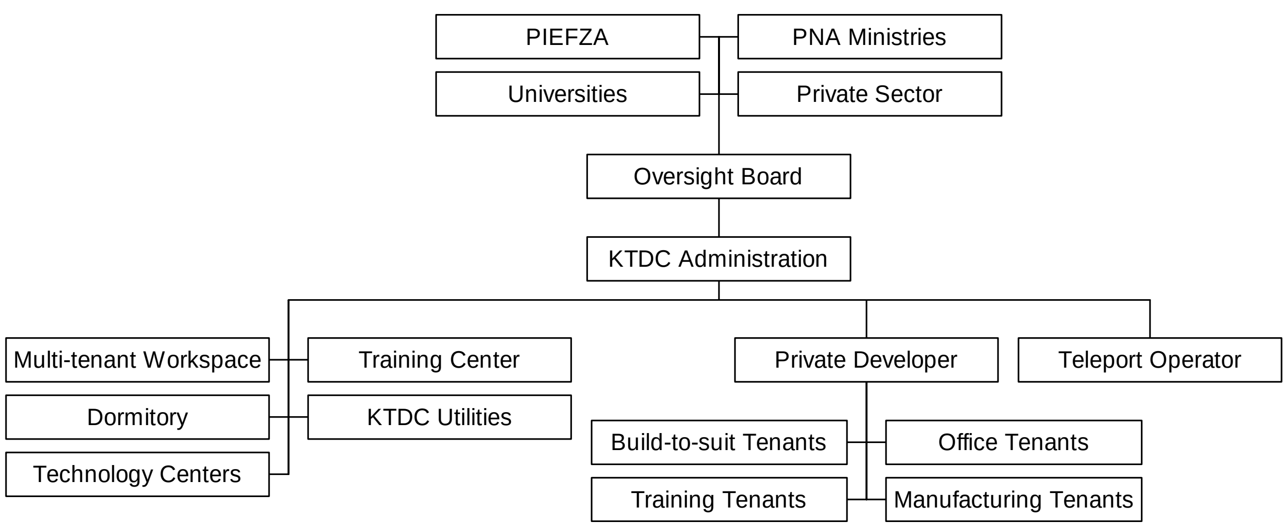
5. Linking Academia to industry

- Create industry learning experiences and internships for students and instructors
- Organize industry to cooperate on planning, curriculum development, and assessments.
- Organize skills alliances among companies

Institutional Framework

Implementing the policy regime and human resources development described above in a way that supports private investment in the KTDC requires an institutional oversight framework that supports flexible, market-driven, and results-oriented implementation of the KTDC. An appropriate oversight and accountability body to oversee the KTDC is a public authority in the form of an Oversight Board that draws its membership from specific KTDC stakeholders, including the private sector. This structure is illustrated below.

Proposed KTDC Organizational Structure



Under this structure, the Oversight Board sets strategic planning direction for the KTDC, but leaves operational planning and supervision to the KTDC Administration, headed by a professional Manager. This KTDC Administration in turn oversees three kinds of entities:

1. Public facilities: The KTDC Administration should operate a number of public facilities, including a Central Administration building, the KTDC Training Center, and an on-site Dormitory. The KTDC's public facilities should also include a Multi-tenant Workspace, which offers relatively small office space units at subsidized rental rates to small businesses and individual entrepreneurs. In addition, the KTDC will offer public Technology Centers that provide central facilities and services in specialized disciplines such as software development or hardware/network support.

2. Private developer: The KTDC Administration will also oversee the Private Developer (or developers) who takes on the responsibility to improve the raw KTDC land through a number of development activities. These include the installation of services, with serviced land parcels then being leased to Built-to-suite Tenants, who construct their own facilities. The developer will also construct buildings on a speculative basis to attract Office Tenants and Training Tenants who wish to locate in the KTDC. In addition, a limited portion of the KTDC land may be available for a limited number of technology-intensive Manufacturing Tenants.

3. Specialized services: In addition to any KTDC Utilities, the KTDC Administration will also oversee specialized service providers such as a private Teleport Operator. Such a provider would be unusual in that the operator would likely be the sole provider of telecommunications services in the KTDC, and thus fall under a unique regulatory regime.

10. KTDC Product Definition: Physical Facilities

Based on the KTDC's unique site attributes and planning constraints and on the demand projections developed under the market assessment, the site development proposal calls for a phased development of the available 20 hectares over a 20-year planning period. Initial development should take place close to the existing institutions. Phasing has two main objectives – to allow inaccessible land to be packaged for later use when current restrictions on use are lifted (e.g. the DCO site); and to segment the project so that changes in development strategy during the life of the project can be more easily accommodated. The figure on the following page illustrates the proposed planning and phasing approach for the KTDC.

The main functional elements in this planning proposal includes:

- Two main entrances – one opposite the existing Israeli border post and one alongside the existing Technical College.
- Public facilities– central services, training center, and multi-tenant workspace
- Special production areas to accommodate the KTDC's limited manufacturing/workshop activities
- Water system linked to the Tulkarem municipal network, as well as an on-site elevated storage tank
- Electrical supply, consisting of a direct Israeli grid connection plus limited on-site generation capacity
- Storm water collection through a drainage system, leading into a filtration/re-infiltration system
- Sewage treatment, either through a new treatment plant or upgrading of the existing system
- Fire hydrant system and booster pumps drawing on-site, non-potable well water
- Landscape irrigation system drawing from the same non-potable water wells


KHADOURY TECHNOLOGY COLLEGE
NATANYA
D.C.O
INDUSTRIAL AREA
TULKAREM CITY
PHASE 1
STAGE A
STAGE B
PHASE 2
STAGE A
STAGE B
PHASE 3
STAGE A
STAGE B
KHADOURY TECHNOLOGY DEVELOPMENT CENTER
DEVELOPMENT PHASING
SCALE 1:2500
TSG
The Services Group
FIRST OPTION

TSG

In addition to these elements, the KTDC will need to supply its tenants with low-cost, high-speed telecommunications access if it is to be competitive. Because the current Palestinian telecommunications pricing structure is uncompetitive for information technology firms, provision of KTDC telecommunications services can be accomplished through either the existing PALTEL network but at concessionary rates, or through a separate on-site teleport with direct access to satellite communications. Given that PALTEL is in the process of upgrading the entire telecommunications infrastructure in the West Bank, and that the Palestinian Authority has the power to rule on tariffs in education-related instances, the provision of a Teleport at the KTDC by Paltel within their new infrastructure would seem to be the logical means to ensure the growth of the KTDC. The alternative would be to deregulate telecommunications services within the KTDC, allowing an operator to set up his own gateway.

The projected capital costs required under the proposed planning approach are described below.

Overall KTDC Capital Budget over 3 Phases

		Phase 1		Phase 2		Phase 3		Total	
No.	***Item***	***Capital***	***Recurring***	***Capital***	***Recurring***	***Capital***	***Recurring***	***Capital***	***Recurring***
1	Buildings	15,620,777	390,519	14,774,952	369,374	11,611,416	290,285	**42,007,145**	**1,050,179**
2	Fire Water System	232,500	23,250	32,000	3,080	32,000	3,080	**296,500**	**29,410**
3	Landscaping	1,627,910	84,022	1,025,610	35,957	714,460	48,811	**3,367,980**	**168,790**
4	Sewage Treatment	720,100	17,858	532,800	13,320	16,200	348	**1,269,100**	**31,525**
5	Stormwater Drainage	235,500	5,888	49,500	1,238	23,200	2,320	**308,200**	**9,445**
6	Water Supply	411,360	18,636	7,700	770	17,860	1,786	**436,920**	**21,192**
7	High Voltage Supply	876,301	61,418	436,700	23,233	344,340	22,209	**1,657,341**	**106,859**
8	Irrigation	123,800	14,880	860	136	32,820	3,282	**157,480**	**18,298**
9	Telecommunications	340,000	34,000	57,250	5,725	31,750	3,175	**429,000**	**42,900**
TOTAL		**20,188,248**	**650,470**	**16,917,372**	**452,832**	**12,824,046**	**375,296**	**49,929,666**	**1,478,598**

11. Financial & Economic Analysis of the KTDC

The financial model of the KTDC analyses all public and private cost centers associated with the KTDC, and calculates for each:

- Phased cost development schedules
- Income, operating costs, and cash flow projections
- Balance sheets over the 20-year timeframe
- Rates of return (NPV and IRR)

The model's base case scenario yielded negative cash flow and returns for both Public and Private cost centers. In order to gauge the materiality of the negative cash flow on Private cost centers, a subsidy was added to the model. The level of the subsidy is designed to improve the IRR of Private cost centers to 20%. The results of these scenarios are listed below.

Base Case returns by cost center ($000)

Cost Center	NPV@ 5%	NPV@ 15%	IRR w/o Subsidy[1]	IRR w/ Subsidy[2]	Subsidy[2]
PUBLIC SECTOR:					
Administrative	(16,223)	(8,244)	N/A	N/A	N/A
Technology Center	(9)	(60)	4.19%	N/A	N/A
Training & Dormitory	(2,846)	(2,010)	N/A	N/A	N/A
Multi-Tenant Workspace	(449)	(276)	N/A	N/A	N/A
Combined Public	(19,527)	(10,278)	N/A	N/A	N/A
PRIVATE SECTOR:					
Serviced Land	(224)	(68)	49,71%	49.07%	49
Office	(1,258)	(1,504)	(0.61%)	22.62%	1,751
Manufacturing	(381)	(413)	(4.07%)	19.60%	502
Private Training	(188)	(162)	(13.99)	20.09	184
Combined Private	(1,965)	(1,965)	(2.55%)	19.98%	2,487

1 If negative cash flows are too great or never become positive, the IRR calculation is meaningless.
2 Subsidies are only applicable to private-sector cost centers.

The net present value of the combined subsidy at 5% and 15% is $2.0 million and $1.5 million, respectively. The public sector capital expenditure schedule on which these figures are based is as follows:

Public Sector Capital Expenditure Years 1- 20

Financial Analysis

Combined Public
Combined output for the public sector

Year	0	1	2	3	4	5	6	7	8	9	10
m2 Developed (per Demand Schedule)		3,120	1,600	660	420	-	2,000	300	-	-	-
Cumulative m2 Developed (Demand)		3,120	4,720	5,380	5,800	5,800	7,800	8,100	8,100	8,100	8,100
m2 Developed (input)		3,120	1,600	660	420	-	2,000	300	-	-	-
Cumulative m2 Developed (input)		3,120	4,720	5,380	5,800	5,800	7,800	8,100	8,100	8,100	8,100
Capital Budget											
Land	1,000,000	87,600	49,440	21,006	13,768	1,125,509	69,556	10,746	-	-	-
Offsite Infrastructure	2,161,610	-	-	-	-	1,050,005	-	-	-	-	364,595
Onsite Infrastructure	-	173,340	88,893	36,668	23,334	-	111,116	16,667	-	-	-
Building Construction Costs	-	1,263,776	668,666	305,917	194,674	-	781,120	139,053	-	-	-
Computer Equipment & Systems	-	188,000	110,000	-	23,000	275,000	110,000	23,000	-	385,000	23,000
Office Equipment	-	34,000	20,000	-	-	-	24,000	-	-	-	-
Other Equipment	-	129,112	30,000	-	-	-	114,112	-	-	-	-
Total Capital Budget	3,161,610	1,875,829	966,999	363,591	254,777	2,450,514	1,209,904	189,467	-	385,000	387,595

Year	11	12	13	14	15	16	17	18	19	20
m2 Developed (per Demand Sche	-	-	-	-	-	-	-	-	-	-
Cumulative m2 Developed (Demai	8,100	8,100	8,100	8,100	8,100	8,100	8,100	8,100	8,100	8,100
m2 Developed (input)	-	-	-	-	-	-	-	-	-	-
Cumulative m2 Developed (input)	8,100	8,100	8,100	8,100	8,100	8,100	8,100	8,100	8,100	8,100
Capital Budget										
Land	-	-	-	-	-	-	-	-	-	-
Offsite Infrastructure	-	-	-	-	-	-	-	-	-	-
Onsite Infrastructure	-	-	-	-	-	-	-	-	-	-
Building Construction Costs	-	-	-	-	-	-	-	-	-	-
Computer Equipment & Systems	-	385,000	23,000	-	385,000	23,000	-	385,000	23,000	-
Office Equipment	24,000	-	-	-	-	24,000	-	-	-	-
Other Equipment	114,112	-	-	-	-	114,112	-	-	-	-
Total Capital Budget	138,112	385,000	23,000	-	385,000	161,112	-	385,000	23,000	-

The base case model was then tested for sensitivity to changes in demand and capital costs.

Public Cost Center Recap—NPV (US Dollars)

Scenario	Admin	Tech Center	Public Training	MTWS	Combined
#1—Base	(8,244,427)	(59,791)	(2,010,454)	(276,155)	(10,277,993)
#2—Demand + 20%	(7,903,562)	(71,749)	(2,802,248)	(331,386)	(10,682,713)
#3—Demand - 20%	(8,687,698)	(47,833)	(1,218,758)	(220,924)	(9,975,764)
#4—Capital Costs + 20%	(11,306,842)	(121,479)	(2,738,676)	(392,747)	(14,121,673)
#5—Capital Costs – 20%	(7,756,664)	(751)	(1,335,265)	(150,204)	(9,048,944)

Private Cost Center Recap—Subsidy Required to Achieve 20% IRR (except for case 4, where IRR=0%) (US Dollars)

Scenario	Serviced Land	Office	MFG	Private Training	Combined	NPV@15% of Subsidies
#1—Base	48,904	1,750,980	502,292	184,393	2,486,569	1,484,442
#2—Demand + 20%	79,039	1,890,194	584,959	221,036	2,775,228	1,644,917
#3—Demand - 20%	78,770	1,384,471	403,708	147,513	2,014,462	1,197,349
#4—Capital Costs + 20%	*167,586*	*2,462,210*	*907,185*	*416,735*	*3,953,717*	*2,301,655*
#5—Capital Costs – 20%	0	938,974	256,341	152,001	1,347,316	803,785

The conclusions are clear from the financial analysis – there are three major requirements for the private sector to invest in this project to the degree modelled. These are:

1. All off-site infrastructure must be provided by the public sector in advance of development, and the administration and promotion of the project must be fully supported by the public sector,

2. Development of the KTDC's private cost centers will require some form of subsidy program. The NPV of this subsidy package should be about $1.5 million.

3. While releasing publicly owned land to private developers at below-market rates is a common subsidy approach for technology parks, this approach is insufficient in the case of the KTDC. Releasing public land to the private developer at zero cost lowers the NPV of the required subsidy to $1.1 million, but does not eliminate the need for other subsidies. Of

course, this approach also represents an additional cost to the KTDC's public cost centers.

4. Some form of access to soft loans will need to be made available to keep loan interest rates under 10% for the developer.

Undertaking the KTDC project must thus be justified based on positive economic returns created through the injection of public investment. The study's economic model assesses the positive impacts that accrue to the various actors in the economy – the workers in the KTDC, the businesses in the KTDC, and the PA itself. The results of the model's base case scenario are summarized in the following table.

KTDC Economic Returns – Base Case Scenario

	Discount rate	Workers	Investors	PA	Total
Incremental Economic Net Present Value	5%	$ 173,411,339	$ 321,498,096	$ 105,187,664	$ 600,097,100
	10%	$ 92,783,833	$ 164,383,450	$ 36,009,623	$ 293,176,906
	15%	$ 53,922,778	$ 83,914,917	$ 7,889,795	$ 145,727,489
Incremental Economic Internal Rate of Return					**43%**

According to the economic model, the main economic benefit arises from benefits to the workers at the KTDC. This net incremental benefit amounts to a NPV of $93 million at a discount rate of 10%. The benefit measured is just the net benefit, i.e. the benefit arising from the KTDC less the benefit that would have arisen in any event without the KTDC.

In addition, the net economic benefit to the Palestinian private sector has an NPV of US$164 million at the same discount rate, while the NPV of benefits accruing to the Palestinian Authority is $36 million. The total NPV of the project's net benefits discounted at 10% is $293 million, which yields an economic internal rate of return of the KTDC project of 43%.

Overall, the NPV (at 10% discount rate) of the public sector investment in the KTDC (including subsidies to the private sector) is estimated at $15 million. Given that the NPV at 10% of the economic benefit of the project exceeds $290 million, there is no reason for the PA not to undertake this public investment.

12. KTDC Implementation

Implementation Plan

Action	Responsibility	Year 1				Year 2				Year 3			
		Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Physical Planning													
Form KTDCA	PIEFZA												
Land Transfer	PNA												
Detailed Design Studies	KTDCA												
Develop 5 ha site	KTDCA												
Marketing													
Prepare prospectus	KTDCA												
Find Developer	KTDCA												
Market to tenants	KTDCA/Dev					*Ongoing*							
Institutional Development													
Convene Educational Inst.	KTDCA												
Form HR and Innovation Groups	All							*Ongoing*					
Form linkages	All										*Ongoing*		
Infrastructural Development													
Form Telecoms consortium	PALNET/TBD												
Prepare business plan	Consortium												
Install added value services	Consortium												

1. Introduction

1.1 Background

The Palestinian Authority (PA) has embarked on an ambitious program to foster the development of private industrial estates and free zones to stimulate economic growth and diversification in the Palestinian economy. Under the auspices of the Palestinian Industrial Estates and Free Zones Authority (PIEFZA), this program has produced tangible results in the form of the Gaza Industrial Estate (GIE), which is currently leasing first-phase industrial property to local, Israeli, and international tenants. PIEFZA intends to implement other industrial estate and free zone projects in West Bank/Gaza, and has commissioned feasibility studies for potential projects in Nablus, Jenin, Tulkarem, Tarqumiya, and Rafah.

The United States Agency for International Development (USAID) supports PIEFZA through its Supporting Investment, Trade, and Employment in Palestinian Industrial Estates and Free Zones (SITE) project, which is being implemented by The Services Group (TSG). Under the SITE project, USAID is funding three feasibility studies, including this study of a potential site at Tulkarem.

To date, feasibility studies have concentrated on assessing the potential for industrial estates aimed at light manufacturing activities in West Bank/Gaza. While this approach holds great potential for attracting investment to West Bank/Gaza and generating employment and economic growth, there has also been a long-held belief that West Bank/Gaza could further diversify its economy by developing links to Israel's booming high-technology industry. The existing skills shortage in the Israeli labor market and initial attempts by Israeli high technology companies to establish joint ventures with Palestinian partners seem to support this line of reasoning.

In selecting potentially feasible sites that warrant analysis at the feasibility study level, one of the sites considered was a relatively small (about 20 hectare) plot at Khadoury College in Tulkarem. An initial assessment of the site indicated that it might be an appropriate location for a technology-focused industrial estate that could be linked to the Israeli high-technology industry. This conclusion was based on the following arguments:

- The site's small size and urban location limit the opportunities for development of a full-blown industrial park.
- The site's strategic location on the green line and within "Area A" gives the PA full planning autonomy on a border estate.
- Tulkarem is located directly on the Tel Aviv-Haifa corridor, Israel's high technology center.
- The site is located adjacent to an existing training institution that offers computer and electrical engineering courses.

Based on the perceived market opportunity in the Israeli high technology sector and on the attributes of the Tulkarem site, it was decided to dedicate SITE project resources to a feasibility study of a Khadoury Technology Development Center (KTDC) at Tulkarem. The study commenced with an initial field mission by the TSG team in May 1999.

1.2 Study Objectives

The objective of this study is to determine whether or not development of a KTDC at Tulkarem is feasible. In general terms, this feasibility assessment has three components:

1. Determining the potential demand that exists for KTDC-based land, facilities, and services
2. Designing a KTDC "product" to meet the demand of potential KTDC tenants and users
3. Calculating the financial and economic returns that the proposed KTDC is able to generate

If the KTDC is found to be feasible, the study will also outline an appropriate development strategy and implementation plan that describes an appropriate, phased development plan for the project.

The remainder of this document presents TSG's feasibility analysis. The study is divided into the following sections:

Section I: Feasibility Study Framework

This section introduces the study's rationale for examining a potential KTDC at Tulkarem, and describes the TSG team's general approach towards technology park development. This description includes appropriate development models and outlines the success factors that determine technology park performance. These success factors are illustrated through a series of case studies that help to guide and inform the feasibility study.

Section II: Existing Location Attributes

The next section examines location attributes that shape the KTDC design. Existing conditions are described and KTDC development constraints identified across a variety of issue areas in terms of technology policies, human resources, and economic structures. The section then turns to an analysis of the physical and infrastructure characteristics that define the Khadoury site, and benchmarks the proposed location's attributes against a number of existing technology park developments in other countries.

Section III: Sources of Demand and Product Definition

This section then turns to an analysis of the KTDC's international dimension – the technology-driven industries and industry niches, and the potential demand that they represent for the KTDC. This assessment includes both the potential demand from the Israeli high-technology corridor and broader international demand. Following this demand analysis, the section develops a profile of the KTDC "product", based on the potential demand for KTDC facilities and services, and on the constraints for providing these facilities and services that were identified in Section II.

Section IV: Development Approach

The final section then describes the models used to analyze the KTDC's financial and economic rates of return, and tests how robust those returns are under a number of sensitivity analyses. Following this assessment, a KTDC development vision and strategy is developed, followed by an implementation plan outlining the steps required to make the KTDC a reality.

2. Rationale and Approach

2.1 Rationale for the KTDC at Tulkarem

The introductory chapter described in general terms the basic reasoning behind selecting the identified 20-hectare site as a location where a technology development center could potentially be implemented. These included site attributes such as the relatively small size, strategic location, synergies with Israeli industry, and access to an existing training institution. These reasons represent the basic motivating factors for undertaking this feasibility study.

This chapter describes in greater detail the rationale for examining the feasibility of a technology development center at Tulkarem. In order to do so, the chapter examines the unique Palestinian development context and the impact is has on developing a KTDC design. To arrive at this design, the chapter:

- Describes the place West Bank/Gaza occupies in the world development context, and how this position impacts on the KTDC's basic mission

- Outlines the basic features of science and technology parks, and how they are applied to different national and regional development contexts

- Presents an analytical framework for understanding how economies can move up technology trajectories over time, and how science and technology parks help to drive that process

- Illustrates different science and technology park development approaches through case studies to show how different park models have been used to achieve different goals

- Draws conclusions about the applicability of international science and technology park development experience to the design of the KTDC

This basic approach sets out the framework under which the KTDC is to be evaluated. It is then combined in subsequent sections with a detailed assessment of existing location attributes and industry demand to arrive at a KTDC "product" definition and a detailed KTDC development approach that are ultimately tested for their financial and economic feasibility.

2.2 West Bank/Gaza in the World Development Context

The KTDC is not envisioned as a simple office park development that offers space and services to an existing industry cluster. The Palestinian economy is not sufficiently developed or technology-intensive to warrant that kind of real estate-driven project. Instead, the KTDC is seen as an opportunity for focused public and private investment that can help to deepen West Bank/Gaza's technology and human resources base, support entrepreneurial development, attract investment, and stimulate private sector-oriented cross-border cooperation.

Table 2.1: West Bank compared to other selected economies, GDP per capita, 1997

SELECTED COUNTRIES	GDP PER CAPITA, 1997	SELECTED COUNTRIES	GDP PER CAPITA, 1997
United States	$30,464	Mexico	$7,499
Singapore	$27,027	Turkey	$6,690
Hong Kong	$25,966	Colombia	$6,684
Norway	$25,455	Poland	$6,604
Japan	$24,935	Brazil	$6,006
Austria	$23,730	Algeria	$5,833
France	$23,358	Iran	$5,656
Canada	$23,305	South Africa	$5,591
Germany	$22,419	Romania	$4,585
Italy	$21,925	Russia	$4,582
United Kingdom	$21,861	West Bank	$4,500
Australia	$21,368	Indonesia	$4,462
Sweden	$20,530	Egypt	$4,381
Israel	$18,067	Peru	$4,298
Spain	$16,493	China	$3,686
Taiwan	$14,192	Kazakhstan	$3,376
South Korea	$13,733	Philippines	$3,272
Czech Republic	$11,653	Pakistan	$2,512
Chile	$11,511	Ukraine	$2,280
Malaysia	$10,834	Vietnam	$1,704
Saudi Arabia	$10,305	India	$1,629
Argentina	$9,861	Bangladesh	$1,596
Venezuela	$8,484	Nigeria	$1,212
Thailand	$8,461		

[a]Estimates are based on purchasing power parity conversion rates published in the World Bank's World Development Report (1996).
Estimates for countries not included in the World Development Report make use of the PENN World Tables and other published sources.

As table 2.1 demonstrates, West Bank/Gaza is now among the world's poorest economies. GDP per capita for all of West

Bank/Gaza was approximately $4,100, adjusting for purchasing power parity, and approximately $4,500 for the West Bank, not including Jerusalem.[1] The West Bank alone has a somewhat higher GDP per capita, but still ranks among the poorer of the world's developing countries. This low level of GDP (especially when compared to Israel's per capita GDP, which is roughly four times higher) is indicative of serious economic problems. These include the legacy of colonial and Israeli control, the *Intifada*, the Gulf War, and tight economic controls imposed by the Israel since 1993. It also reflects deteriorating and inadequate capital in many infrastructure sectors, and weaknesses in the education system.

While these figures indicate that West Bank/Gaza is a very different kind of investment location from North American, European, and Asian technology leaders, this does not mean that West Bank/Gaza's current level of development precludes the development of technology-based industries. The same GDP figures show that countries such as Indonesia, the Philippines, China, and India, all of which have a lower per capita GDP than the West Bank, have been able to develop significant technology clusters within the context of less developed economies. The same is true for countries such as Turkey, Thailand, and Malaysia, which are more developed than West Bank/Gaza but evidence per capita GDP levels well below that of Israel.

The <u>ability</u> of countries to promote technology-driven economic growth is thus not dependent on their level of economic development. Instead, this level of overall development has important implications for the <u>kind</u> of technology-driven initiatives that can play a meaningful role in accelerating economic growth in an economy such as West Bank/Gaza. The key to implementing <u>appropriate</u> initiatives for technological development thus lies in configuring technology development projects that are responsive to West Bank/Gaza's unique economic and political characteristics. The KTDC design must reflect these realities of West Bank/Gaza if it is to help achieve West Bank/Gaza's development goals and objectives. Table 2.2 summarizes some of these unique Palestinian attributes, and compares them to a number of comparator countries.

The unadjusted figures were $1,441 and $1,588. Adjustment for purchasing power parity is consistent with information in Ishac Diwan and Radwan Shaban, ed., Development Under Adversity: The Palestinian Economy in Transition, World Bank, 1999, p. 12.

Table 2.2: Comparing West Bank/Gaza to Selected Economies: Other Indicators

	Average labor productivity, 1993 (GNP divided by the labor force)	Females as pct. of labor force (1993 unless otherwise noted)	Pct. of children enrolled in secondary school (1991 unless indicated)	Illiteracy rate in population > 15 yrs. (1990 unless specified)	Infant mortality rate per 1000 births (1993 unless otherwise noted)	Life expectancy at birth in years (1993 unless indicated)
Bahrain	$17,651	10.3	97	22.6	17.6	72.2
Cambodia	(m)	37	(m)	64.8	113.2	52
China	$816	43.3	51	26.7	30.5	69
Cyprus	$22,406	35.9	90 (4)	(m)	8.6	77
Egypt	$2,359	10.5	80	51.6	64.4	64
India	$789	24.7	38	51.8	80	60.8
Israel	$37,757	33.7	85 (4)	4.9 (2)	8.8	76.6
Jordan	$7,677	11	91 (3)	19.9	27	70.1
Korea	$17,090	34.1	88	3.7	10.6	71.3
Lebanon	(m)	27.5	63 (1)	19.9	33	68.8
Libya	(m)	9.8	(m)	36.2	65.6	63.7
Mexico	$9,741	27.3	55	12.7	35.4	71
West Bank/Gaza	$7,000	48.1 (7)	85 (7)	15 (6)	28 (5)	72 (5)
Portugal	$18,491	36.8	68 (4)	15	9.6	74.7
Russian Fed.	$4,791	54.1 (3)	(m)	2 (3)	20.6	67.5
Thailand	$3,944	43.9	33 (4)	7	36.4	68.8
Tunisia	$5,283	24.6	46	34.7	41.8	68.1
Turkey	$7,178	33.9	55	19.3	65	66.9
Vietnam	$340	46.8	33 (4)	12.4	41	65.5

Notes: (m) denotes missing value; (1) denotes 1988; (2) signifies 1985; (3) signifies 1989; (4) denotes 1990; (5) is 1994; (6) is 1995; (7) is 1998. Source: Social Indicators of Development, http://www.ciesin.org/prof/charlotte, and Diwan and Shaban (1999).

Without diminishing the importance of current unemployment and falling incomes as a policy concern, it is important to note that the GDP per capita figure can also be misleading as an indicator of economic development. Other data justify what the noted economist, Joseph Stiglitz, calls "enormous potential":

> *"The most important asset any country has is its people. It takes much more time to build a high-quality work force than it does to build infrastructure and factories. The Palestinian economy is blessed with excellent people . . . a vibrant and well-organized civil society, … an extensive international network of skilled and wealthy expatriates, a location at the trade intersection of East and West, no government debt, a good tax system, and widespread international sympathy."* [2]

[2] Diwan and Shaban, pp. xi-xii

By the two measures of human capital – the literacy rate and the percent of all school-aged children enrolled in secondary school, West Bank/Gaza is as well- (if not better-) positioned than other Middle Eastern and North African countries examined, excluding Israel. West Bank/Gaza also compares well against other countries in the table that are ranked higher in terms of per capita GDP: Turkey, Mexico, Portugal, and Thailand. Similarly, health indicators – life expectancy and infant mortality – suggest a higher level of development than the GDP figures in table 2.1.

Another important indicator is labor productivity. At $7,000 per worker in 1993, Palestinian productivity was more than twenty times greater than Vietnam's, approximately nine times greater than China's and India's, three times that of Egypt, and one- and-a-half times greater than Russia's. Its average productivity was similar to Jordan's and Turkey's, and not far behind Mexico's, all countries with higher per capita GDP figures.

However, while labor productivity in West Bank/Gaza indicates is a high amount of value-added in production (the human capital content of output), this productivity level is also reflected in wage levels, as indicated in table 2.3.

Table 2.3: Comparative Wage Levels

Country	1997 wages per hour
India	$0.19
Egypt	$0.63
China	$0.72
Jordan	$0.96
Thailand	$0.99
Mexico	$1.02
Turkey	$1.16
Russian Fed.	$1.95
Bahrain	$2.77
Portugal	$3.07
West Bank	$3.16
Korea, Republic	$7.26
Israel	$10.15

Source: http://www.ita.doc.gov/import_admin/records/wages/97wages/gdp99web-2.htm. Some countries in Table 2 are omitted due to missing data.

West Bank/Gaza is not among the typical low value-added, low wage countries. Average wages in the West Bank (a few cents higher than for West Bank/Gaza as a whole) surpass every other country in the table, except Israel. These higher wages reflect, to some degree, the economic base of West Bank/Gaza, but also some unique characteristics. The economic base, for example, is not as dominated by low-value agriculture as in other developing countries (16 percent of the labor force was in agriculture in 1996). Almost 30 percent of the labor force in 1996 was in industry and construction. Moreover, firms in West Bank/Gaza tend to be small in size: 90 percent of establishments have less than 10 employees. That is consistent with an economy that is not oriented toward low-wage mass production. Wages in West Bank/Gaza also have been driven up the proximity to Israel (what economists call "wage roll out") and by the infusion of donor assistance, which have been used in part to increase public sector salaries and consumption.

However, while West Bank/Gaza is not among the lowest wage, lowest value-added economies, it is also not yet a technology-intensive economy. In terms of teledensity , West Bank/Gaza had only 3.1 phones per 100 people in 1993, compared to 37.1 in Israel, 7.0 in Jordan, and 9.3 in Lebanon.[3] While PalTel has been actively increasing the cable network and level of connectivity, telecommunications infrastructure and pricing policies remain an issue.

Table 2.4: Comparative Technological Preparedness

Country	Percent of Enrollment
West Bank/Gaza (est.)	26.0
Korea, Republic	20.1
Russian Fed.	18.5
Israel	9.9
Portugal	8.7
Jordan	7.0
Mexico	4.4
Turkey	3.7
Thailand	3.0
Egypt	1.6
India	1.4
Bahrain	1.2
China	1.1

Source: World Bank, 1999 World Development Report. Percentage for West Bank/Gaza is estimated separately.

On the other hand, West Bank/Gaza's human capital is relatively technology-oriented. The World Bank publishes an index of technological preparedness, based on student enrollment in the

[3] Diwan and Shaban, 1999, p.7.

natural sciences, mathematics and computer science, engineering, and transport and communications studies. This index includes scores around 20 percent in South Korea and 18.5 percent in Russia, to less than 1 percent in many developing countries. West Bank/Gaza's index score of 26 percent is thus high relative to both regional competitors and other countries with similar development characteristics that have been successful in attracting technology-based investment.

Considering the levels of human capital and donor assistance in West Bank/Gaza, and the artificial distortions which were imposed on the Palestinian economy under Israeli control, there is general agreement that current GDP figures are depressed. Joseph Stiglitz estimates that West Bank/Gaza's "expected" GDP per capita should be twice as high as current levels, which would rank West Bank/Gaza closer to Argentina and Venezuela than to Russia and Indonesia. The challenge is to design an appropriate KTDC that can help West Bank/Gaza to begin realizing that potential in the short run and move further up the development ladder in the medium- and longer-term.

2.3 The Role of Science and Technology Parks

National technology policies represent a large mosaic of inter-related subject areas, including intellectual property protection, competition and deregulation policy, education and training, tax treatment and incentives, government procurement, basic science, and capital markets, among others. The PA is only now beginning to exert independent control over some of these areas, and formulation of an integrated Palestinian technology policy has not yet begun.

One of the attractive features of science and technology parks in developing countries is that they can be implemented more quickly than national reforms, and can serve as a test bed for those national reforms. For example, while India remains an economy hobbled by bureaucratic inefficiency, burdensome regulations, and state intervention in the economy, the booming Indian IT industry was spearheaded by a few software parks that were granted liberalized, market-priced access to modern telecommunications infrastructure. By being allowed to establish their own INETLSAT earth stations within export-oriented software parks, Indian entrepreneurs were able to translate India's technological human resource potential into a real technology cluster that has become a world leader in software and data processing outsourcing.

The developing country technology park is thus not a substitute for overall economic liberalization and technology promotion, but can serve both as a technology development "experiment" within the broader national economy and as a geographic focus around which technology-based companies, training institutions, and research facilities can converge. One of the paradoxes of the "borderless" information technology industry, for example, is it's strong tendency towards grouping around geographic clusters - be they Silicon Valley, Routes 128 and 66, or the Haifa-Tel Aviv corridor.

The objective for establishing the KTDC is thus to develop the site as a catalyst for higher-tech development that will eventually spill beyond the physical confines of the site. The Tulkarem project can serve a critical role in the transition of the Palestinian economy from one struggling for definition, with a mix of traditional agriculture, building materials and construction, and medium-value added sub-contract manufacturing, to one with a higher knowledge content. The model must exploit the existing strengths of the Palestinian economy while providing a focus for concentrated public investments. The challenge in designing this KTDC is to identify the activities on that site that are "appropriate" given that objective.

Technology-oriented parks have been used widely around the world as vehicles for economic development. The number of "research, technology, or science" parks of course depends on how those parks are defined. But by most estimates, over 60 countries (both industrialized and emerging) have established over 250 technology parks, many of which cater specifically to the software and information technology services industry.

Most of these projects share certain basic elements. As defined by the International Association of Science Parks (IASP), science parks are those that:

- Have operational links with Universities, Research Centers and/or other Institutions of Higher Education
- Are designed to encourage the formation and growth of knowledge-based industries or high value-added tertiary firms, normally resident on site
- Have a steady management team actively engaged in fostering the transfer of technology and business skills to tenant organizations

While these parks share common elements, they differ in terms of:

- Objectives
- Size and physical layout
- Ownership and management
- Typical activities and occupants
- Links to universities and technology bases
- Incentives
- Infrastructure, facilities and services

The discussion below reviews these differing aspects of technology parks, and outlines costs and benefits to the sponsoring country and to the individual company locating in such parks.

Objectives

The design, services, and functions of a technology park is first a reflection of its basic purpose. Many countries fail to recognize the fundamental diversity of technology parks, and tend to view these projects as specialized industrial parks. But the purpose and forms of technology parks vary greatly. Common objectives of technology parks include:

- Promotion of research and development in leading-edge technologies
- Serve as a “growth pole” strategy for the development of regions
- Promote entrepreneurship and business development in technology areas
- Generate exports and create jobs in high-tech areas

While none of these objectives are mutually exclusive, successful projects have generally been those that have a clear and limited focus and set of objectives.

<u>Research and Development</u>. In some cases, parks are conceived as long-term instruments to transform economic bases from typically more traditional sectors to higher tech. Job growth in these instances must be measured over a longer period of time as new technologies are developed or different types of businesses are induced to locate in the region. A prime example is Research Triangle Park in North Carolina. The electronics, pharmaceutical, and telecommunications clusters now located there developed

slowly over a forty year period and gradually helped transform the central part of North Carolina from an agriculture- and low-wage manufacturing-based economy to high-tech R&D. Other examples are found in most advanced economies, including the science parks in Finland, Sweden, United Kingdom, South Korea, Japan, Singapore, Taiwan, etc.

Growth Poles. Other parks have been developed as so-called technopoles or growth poles. Parks have served as the cornerstone of growth pole strategy – as a way to move population from dominant cities – in Japan (in Tsukuba Science City and Kyoto), Korea (Taedok Science Town in Taejon), and Taiwan (Hsinchu Science City). In those cases, park development was coordinated with other investment strategies, for infrastructure, higher education and research, and housing. Other prominent examples include the Sophia Antipolis technopole in France and the Medeira Technopole in Portugal.

Incubation. Another explicit objective of technology parks is to serve as an incubator to promote start-ups and business development in defined technology areas. While many parks—such as the Singapore Science Park's Innovation Centre—house incubator facilities on-site, a few parks are incubators themselves. A prime example of this is the Tefen Park north of Haifa in Israel that serves as an incubator for export-oriented technology companies.

Export Generation. Another category of technology parks aim to generate exports in internationally trade services and products. A leading example are the twelve Software Technology Parks in India that currently account for 70% of India's total software and IT services exports of US$4 billion. Other examples are the 80 science and technology parks in China, and the Agean Free Zone Technopark in Turkey.

Size and Physical Layout

Parks range in size from one large building in an urban setting—for example, the University City Science Park in Philadelphia, Pennsylvania, and several facilities in Germany—to several thousand hectares, such as the 8,000 hectare Sophia Esterel Science Park in France.

One common (if not universal) feature of technology parks is their physical attractiveness. Park developers believe that good design and natural amenities are necessary to develop a conducive work environment for knowledge-based industries. As a result, many parks are developed as beautiful campuses with office park facilities. A leading example is the Hsinchu Science-Based Industrial Park in Taiwan, which was deliberately developed to resemble facilities in Silicon Valley in order to attract diaspora Taiwanese engineers working in California.

Examples of modern technology park design and layout include Hsinchu Science Park, Taiwan (top left); Kyoto Science Park, Japan (top right); Research Triangle Park, USA (bottom left); Surrey Research Park, UK (bottom right).

Ownership and Management

Technology parks are owned by universities (University of Utah and Stanford Research Parks in the U.S.), government agencies (the National Science and Technology Development Agency Research Park in Thailand), by private companies (Kyoto Science Park), and by consortia of different public and private stakeholders.

The objectives of the parks reflect their ownership. University-owned parks tend to focus on university-originated technology and on building industry-university linkages. However, universities also see parks as potential sources of real estate revenue (Centennial Campus at North Carolina State University, Cambridge Research Park, UK). Parks sponsored by government agencies are typically part of regional or national development efforts. An increasing number of parks are privately developed and owned. Leading investors in these projects include US, French, British, Singaporean, Thai and South African groups, most of which have a property development background.

Management of parks also varies, but the industry trend is towards professional management services and away from the "do-it-yourself" approach. Some universities and government agencies do continue to operate their own parks. Research Triangle Park, for example, is operated by a not-for-profit foundation that reports to an ownership team comprised of the region's universities and the state government. However, even under these management structures, outsourcing of professional services is becoming common.

Typical Activities and Occupants

Parks also differ in terms of their sectoral focus and industry orientation. Many parks tend to specialize in a few technology and industry areas, serving as "centers of excellence," promoting innovation in a particular area. Examples include:

- Singapore Science Park, Singapore—information technology and telecommunications
- Hsinchu Science-Based Industrial Park, Taiwan—computers, peripherals, integrated circuits
- Bangalore Software Technology Park, India—software and IT services
- Taedok Science Town, South Korea—memory chips, aerospace
- Software Technology Park, Brazil—software engineering
- University City Science Center, USA—engineering, biomedicine, materials
- Helsinki Science Park, Finland—biotechnology, food industry
- National Science and Technology Development Agency Science Park, Thailand—biotechnology, metals and material technology, electronics and computer technology

Government-run technology parks oriented to basic science and R&D typically host government labs. Examples include the NSTDA park in Thailand, the national science labs in the US (Sandia, Los Alamos, and others), and Taedok Science Town in South Korea.

Other technology parks resemble typical office or business parks, accommodating regional and international headquarters companies. Leading examples include Stanford Research Park, Cambridge Research Park and Dublin Science and Technology Park in Ireland.

Links to Universities and Technology Bases

Most successful science parks had a meaningful connection with an institution of higher education. As noted, some parks have been developed by universities as sites for university-related activity (e.g., Stanford Research Park, USA; Cambridge Research Park, UK; Parque Industrial de la Universidad de Guadalajara, Mexico; The Australian Technology Park). Others have forged relationships with nearby universities (Amsterdam Science Park, Sophia Antipolis France, NOVUM Research Park Sweden, Patras Science Park Greece, Tecnopolis Csata Novus Ortis Italy). Parks developing in regions without institutions of higher learning have created them as part of the park's amenities to tenants. That approach, clearly, is costly. Increasingly, parks are connecting to universities and colleges electronically, making immediate proximity less important.

The second type of focus is around technology sectors, usually capitalizing on existing strengths in the regional industrial base and the local universities. Larger parks may have several foci (Research Triangle Park with electronics, pharmaceuticals and biotech, and telecommunications; NSTDA Park in Thailand around biotech, electronics, and materials science). But many parks focus more narrowly, and even use the focus in their name as a marketing ploy (Audubon Biomedical Science and Technology Park, Harry Hines Medical Research Park, Environmental Technology Center Neopoli Oy Finland, Agro-Business Park Denmark, Infopark Budapest, and Kalundborg Ecoindustrial Park Denmark).

Incentives

Different parks provide, through their sponsoring entity, a wide variety of incentives for businesses. Those incentives tend to be largest when the park is part of the national or state government's economic development program. Israel's central government, for example, provides businesses moving to Tefen (and other designated locations) a benefit of 24 percent of their investment in building and equipment grants, or a ten year income tax holiday. However, these types of incentives are usually available to all qualifying high-tech investments, whether or not physically located within a technology park.

However, a few countries have either adapted existing incentives (usually within free zone schemes) or developed new packages specifically for enterprises located within technology parks. A leading example of the latter is the Software Technology Park scheme of India that is a major reason behind the success of the industry, especially in terms of attracting foreign investment.

Infrastructure, Facilities, and Services

Unlike most general industrial parks, technology parks emphasize purpose-built infrastructure and facilities, tailored to meet the requirements of target industries and activities. The range of facilities typically found include:

- Research and testing labs—funded by government and major private corporations
- Business and technology incubators—operated by specialized subsidiary companies or independent operators on a commercial basis, providing a full range of business, marketing, legal, financial, and technical support services for start-up firms
- High-tech office buildings with research units—usually pre-fabricated “intelligent” office buildings, for use on a multi-tenant basis with shared business support facilities and local area networking connections
- Standard factory buildings suitable for a variety of manufacturing and warehousing activities
- Residential, commercial and recreational areas for employees and managers
- Exhibition areas, convention centers, libraries and other
- Training and consultancy center—typically attached to an incubator or testing facility
- Dedicated, high-speed telecommunications facilities, offering high-speed (1.5 mbps) 7/24 lines at international prices, as well as value-added network services
- Centralized support services including dedicated power, hazardous waste collection and disposal, as well as a range of business services at reduced rates (e.g., management training, technical assistance, procurement

assistance, liaison with nearby universities and businesses, regulatory approvals, etc.)

The overall objective is to create a conducive work environment that enhances worker productivity, and promotes technological collaboration and innovation among a cluster of inter-related companies.

Benefits of Technology Parks

The different types of technology parks found around the world vary greatly. Depending on the type of park, industrial focus, extent of government funding, additionality of investment—the magnitude of economic benefits vary significantly. The value of a technology park is also different for each potential beneficiary—host country/region, private company, or university.

Host Country. From the perspective of host countries, technology parks provide a number of potential benefits. The most important of these include:

- Technological development—parks offer the potential for industrial upgrading, research and technological innovation in high-tech areas
- Cluster development—parks can create self-sustaining industrial clusters in core technologies, and lead to the development of technology corridors in a wider area
- Job generation—parks are an efficient means of creating high value-added jobs in leading technologies
- Business efficiency—parks can enhance the operating competitive, image and investment environment of a region
- University-industry linkages—parks can offer a concrete mechanism for collaboration between universities and industries, and a focal point for technology transfer

The economic impact of technology parks is difficult to estimate, given the large variations on types of parks worldwide. According to most estimates, there are some 250 technology, science and research-based parks in some 60 countries worldwide. These parks account for a significant part of high-tech manufacturing and services, especially in developing countries. The software technology parks in India, for example, account for 70% of the export earnings of the software sector overall. Selected examples of these types of projects are profiled in table 2.5:

Table 2.5: Economic Impact of Technology Parks—Some Examples

Technology Park	Size	Established	Firms	Jobs
Singapore Science Park, Singapore	30 hectares	1980	226	7,000
Rennes Atalante Science & Technology Park, France	70 hectares	1978	250	8,000
Hsinchu Science-Based Industrial Park, Taiwan	580 hectares	1980	272	72,623
University City Science Center, Philadelphia, USA	7 hectares	1963	140	7,000
Kyoto Research Park, Japan	8.5 hectares	1988	80	2,400
National Technological Park, Ireland	260 hectares	1991	90	3,500
Technopark Kerala, India	73 hectares	1994	35	2,000
Surrey Research Park, UK	28.5 hectares	1974	76	2,000

Source: TSG research

The overall economic impact of a technology park depends on a number of factors. Parks that have been developed through heavy government outlays for infrastructure development and operation are rarely economically and financially feasible and sustainable. Partnership with the private sector in infrastructure development, therefore, is critical. Operation of the park on a cost-recovery basis is also a factor. Heavily subsidized projects are generally not financially sustainable. The net economic impact of a park also depends on the extent to which investments and employment is truly additional, and would not have taken place anyway in the absence of a park. The impact of a project is also reduced if most investments are simple relocations of companies already operating in the country. Backward supply linkages of high-tech industries also tend to be low, until a critical mass of local, non-park industries develops over time.

Individual Company. Benefits from a technology park location for an individual company vary again depending on the scale and type of investment. For small-scale and start-up investments, for example, the total package of facilities, support services, and technical and financial resources available through a park are a major attraction. In general, location within a technology park—rather than outside—provides firms with a number of benefits:

- Access to a nucleus of technology resources and specialized services in one area

- Scope for collaboration with other technology companies and suppliers

- Access to better-quality, purpose-built infrastructure and facilities and competitive prices
- Reduction in costs through the provision of shared services and facilities
- Superior quality of life and amenities
- Access to a pool of workers, technicians and scientists, with partner universities and institutes
- Access to a competitive package of investment incentives

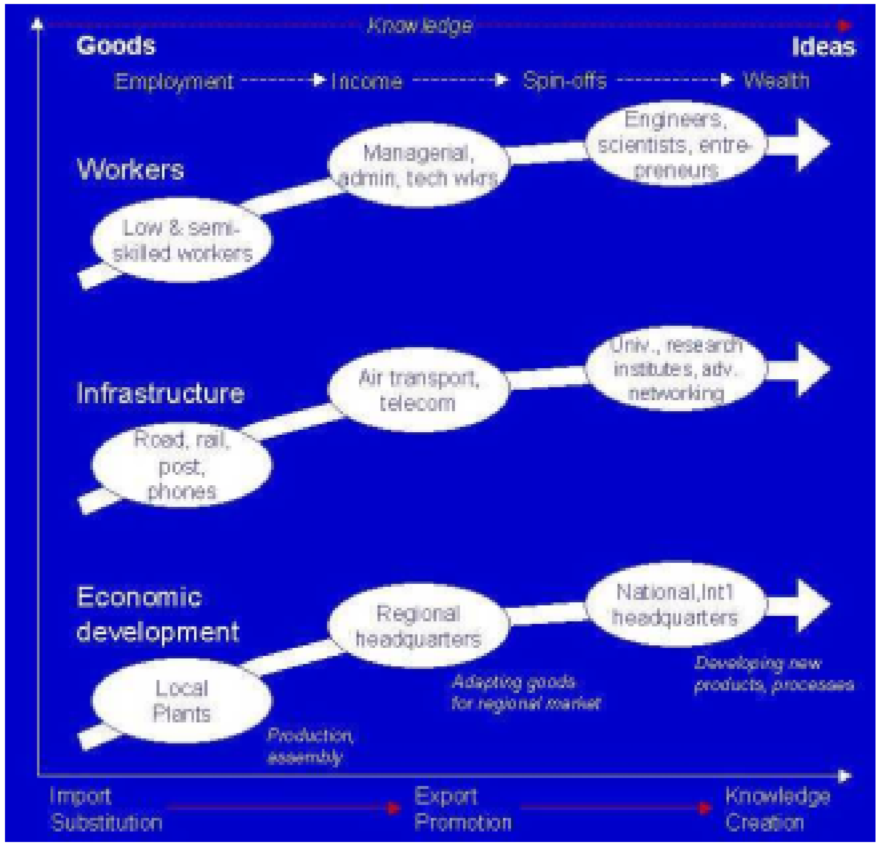
The major drawback of some technology park locations—particularly as projects expand and mature over time—is the possibility of increased labor turnover. Employees can more easily jump from one company to another, given the proximity of similar companies in one area. But these are less prevalent in technology parks compared to general industrial parks.

2.4 Economic Development Trajectories and Technology Park Design

The diversity in the economic development level of different countries that host technology parks is reflected in how those parks are designed and configured – in other words, the different development characteristics discussed in section 2.2 have a strong impact on how successful technology parks are configured from among the different components described in section 2.3.

Figure 2.1 helps to visualize this relationship between national economic development and human resources and capital requirements that need to be reflected in appropriate technology park design. Economies move up a trajectory over time, or from low to higher levels of economic development. Consistent with their movement up that curve, they require different types of human capital and infrastructure. At low/early stages of development, small- and medium-sized plants engaged in low value-added production and assembly, typically for domestic markets as a form of input substitution dominate an economy. They need roads, rails, mail, and phones to connect to the world in order to deliver and receive goods. Their workers are lower- and semi-skilled. The measure of success is full employment and a reduction in capital flight (an improvement of balance of payments).

Figure 2.1: The Economic Development Trajectory



At the next stage of development, industry adds more value in production, adapting goods for local markets (in the Palestinian context, this could be the Arabization of goods), and dedicating more production for export. The SMEs give way to branch plants or affiliates of large multinational corporations, which may establish regional headquarters in the country. With more exports, connection to external markets is important via air and telecommunications. Workers need to be more skilled in production and management techniques. Employment growth is important, but so too is income generation (the export multiplier).

The highest stage of development (characterizing advanced economies) is characterized by industries that are creating new knowledge – specifically, developing new products and processes. Industry uses knowledge infrastructure and knowledge workers: research centers, labs, specialized equipment, high-speed digital communication, and skilled technicians, scientists, and engineers.

The goal is to accumulate wealth through intellectual property rights and the repatriation of profits from elsewhere.

Intermediate between goods adaptation and knowledge creation is the potential for new spin-offs and start-ups. As goods are adapted through applied R&D, new products are invented that have commercial merit. Likewise, more basic research can lead to patents and commercializable products. Associated with this stage are entrepreneurs willing to assume risks.

This progressive trajectory is directly relevant to our discussion of technology park development because of what it implies about the kinds of activities a park can accommodate, and the kinds of services it should provide. For countries at the lower level of economic development, workers require training on how to read instructions and use tools and equipment. Even with mass production, equipment is becoming more sophisticated (i.e. computer numerical controls). Problems arise in the production process that industrial engineers can troubleshoot. Efficiency gains can be realized by operating a pilot plant to establish better practices, and by establishing better buyer-supplier networks.

At the next stage of development, workers need to be trained to perform more sophisticated tasks. For goods to be sold in the international marketplace and for local companies to get contracts from multinational companies for component parts, production must conform to very high tolerances, which requires testing and calibration equipment. The adaptation of goods and creation of commercializable products also benefits from interaction with university researchers and students, who are sources of ideas and expertise. As university researchers and other inventors start to work on new products and processes, they require “crunch,” or spillover space.

Businesses in an advanced economy need to conduct more basic research to remain competitive, and need access to world-class universities, research labs, and sophisticated research equipment (clean rooms, supercomputers, cyclotrons). They also desire to be in attractive and clean environments, since they are relatively footloose. They need access to appropriately-trained scientists and engineers.

Businesses conducting applied or basic research, wanting to commercialize new products and processes, need access to patenting and licensing assistance, entrepreneurial training, start-up funding and marketing assistance, and incubator space.

Each of these functions can be translated into a technology park service.

Implications for the KTDC

Given the place West Bank/Gaza occupies in the global economy, and realistic expectations for the territory given its resources, several conclusions can be drawn about the kinds of park activities that are appropriate for the KTDC. These activities:

- Should not be geared toward low-wage, low value-added manufacturing
- Should not be based on the use of experienced engineers and scientists, using state-of-the-art equipment
- Should exploit the strategic location of the site on the green line and in area A
- Should recognize West Bank/Gaza's position on the economic development trajectory as a country needing to increase exports and increase applied research, with an eye toward more commercializable products.
- Should recognize the presence of software and hardware professionals seeking good jobs

The second part of the section talked in general about the types of developments that are extant elsewhere, identifying the various elements that need to be planned to achieve success. The following section will elaborate further on that, by presenting several case studies.

2.5 Technology Park Case Studies

This chapter described some of the core technology park components, attributes, development approaches, and success factors that can be distilled from successful and unsuccessful technology park developments around the world. This section illustrates this analysis of development approaches through six technology park case studies that reflect a broad range of park objectives, and design, development, and management approaches. The six parks are:

- Taiwan: Hsinchu Science Park,
- Turkey: Aegean Free Zone Technopark

- Thailand: NSTDA Park
- China: Shenzhen High-Tech Industrial Park
- India: Kerala Technopark)
- Malaysia: Kulim High Tech Park

These parks were selected not as a representative sample of all technology parks, but rather as parks that showcase different technology park aspects relevant to the KTDC. All but one of them (Hsinchu in Taiwan) are located in countries that are currently at low- to mid-levels of economic development. These parks were originally conceived as a centerpiece of a technology development strategy and, in some cases, explicitly designed to move the economy up the economic development trajectory. Hsinchu is included because it illustrates how a nation used policy interventions effectively to catapult a national economy along this trajectory.

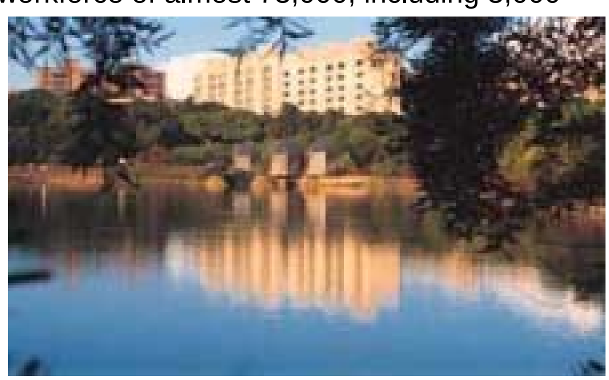
While these cases illustrate many useful and forward-looking development tools and approaches, they also reflect some cautionary lessons about how not to develop a technology park – for example, the lessons of Turkey's Aegean Free Zone Technopark.

Our cases do not include some of the best-known parks in advanced industrial countries, such as as Cambridge and Surrey in the U.K.; Stanford and Research Triangle in the United States; Kyoto in Japan; and Sophia Antipolis in France. While these developments have a fascinating (and well-documented) history, that history is less relevant to the Palestinian economic development context.

Case 1: Hsinchu Science-Based Industrial Park

	Country	Taiwan
	Focus	Electronics, telecommunications, precision machinery and materials, biotechnology
	Established	1980
	Size	600 hectares
	Firms	245
	Jobs	72,673
Components	• Industrial: SFBs, customs bonded manufacturing, laboratories • Residential: Apartments • Recreational: Sculpture park, sports facilities, book shop, pond, flower beds	
Tenants	• 202 Taiwanese companies, 97 of which were founded by returning expatriates • 27 North American, 10 Asian, and 6 European companies	
Services	• Planning, investment, banking, customs clearance, labor management, recruitment, support, land administration, information, and other services • Water treatment & recycling, broadband telecommunications	
Organization	• Science Park Administration is member of the National Science Council • Administration directly runs planning, investment services, labor relations, construction management, land development, medical, warehousing, and administrative activities	

When Hsinchu Science-based Industrial Park (HSIP) was opened in 1980, Taiwan was a relatively low-income developing country whose employment base was concentrated in agriculture and low wage, labor-intensive manufacturing. Since that time, Taiwan has developed into a global technology leader. Between 1980 and 1997, Taiwan's international ranking in per capita GDP improved from 52nd to16th, and its per capita GDP relative to the United States' had improved from 10.1 to 46.5 percent. The phenomenal success of HSIP reflects the rapid development of the Taiwanese economy. Today, the park hosts more than 245 companies on some 600 hectares of land, with total annual sales approaching US$15 billion and a workforce of almost 73,000, including 3,000 Taiwanese returnees from abroad.

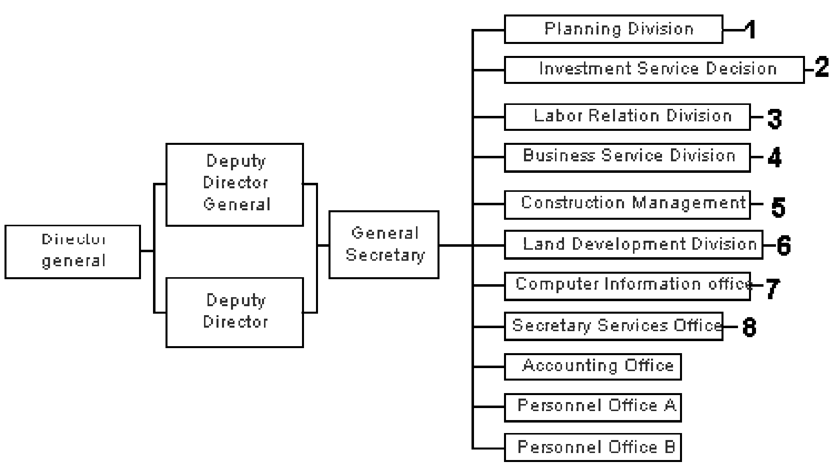


The park's tenant companies are largely concentrated in six groups: integrated circuits, computers and peripherals, Telecommunications, opto-electronics, precision machinery and materials, and biotechnology. 202 of the 245 companies are Taiwanese, including Acer Computers. 97 of the companies in the park were founded by returning expatriates. Ten of the companies are from other Asian countries, 27 are North American, and 6 are European. All are international in their orientation.

The evolution of HSIE as an R&D, as opposed to mass production-oriented center is reflected in data on the qualifications of the workforce and R&D spending. In 1986, for example, 0.8 percent of the workforce in the park had Ph.D.s, and another 5.1 percent had masters degrees. By 1997, 1.2 percent of all workers had Ph.D.s and another 12.4 percent had masters degrees. Also by 1997, park firms were spending approximately 5.4 percent of their sales revenues on R&D, compared to around 1 percent for other firms in Taiwan. The biotechnology firms in the park allocated over 27 percent of sales revenues to R&D. Patent data are also striking: in 1994, companies in the park were granted 226 domestic and 101 foreign patents. The numbers have kept rising until in 1997, there were 1,021 domestic and 566 foreign patents granted to firms located in the park.

HSIP is a creature of the national government, specifically the National Science Council, of which park management is a member. The science park administration directly runs planning, investment services, labor relations, construction management, land development, medical, warehousing, and administrative activities.

HSIP Administration Organizational Chart



The park is fairly self-contained in terms of services: it has its own wastewater treatment plant that recycles treated water to landscape uses. It also has an incinerator and sanitary landfill. In 1995, park administration linked all organizations on-site to a new broadband network from which they can access automated customs clearance, electronic data transfers, water resource management, human resource recruitment with the park administration, and vehicle registration. The net provides all businesses access to the law and regulatory information, libraries, statistical data, and other information. It allows multi-point video conferencing and distance learning.

Banks and customs offices are also located within the park, and two national universities and a technology research institute are located nearby. These institutions conduct research relevant to park businesses, and train the workforce. In 1998, 9,631 park employees took advantage of manpower and development training opportunities, including substantive courses in the six cluster areas, and courses with more general applicability. These disciplines include hazard communication, network and software technology, and management.

Land in the park is divided into industrial, housing, and recreational uses. The industrial area contains standard factory buildings, custom designed factory buildings and laboratories. The residential areas include apartments, sports facilities, restaurants and bookshops. The appearance of the park was given strong priority when the park was designed. The park administration planted flowerbeds, built a pond, and installed sculptures. Residential and industrial space is rented in the park. As of January 1999, the park provided 645 family dwellings and 960 single rooms for rent. In that same month, 340 hectares of land were rented to 139 enterprises, and another 47.9 hectares were owned, by 81 enterprises. Vacancy rates are very low.

The government has invested considerable sums in the development of the park – approximately $600 million for roads, other infrastructure, and amenities. The government has taken a number of steps to get HSIP to where it is today in terms of R&D. It located six national labs on site: the Precision Instruments Development Center, the Synchtronic Radiation Research Center, the National Space Program Office, the Chip Implementation Center, the National Center for High Performance Computing, and the National NANO Device Laboratories. Those facilities attract private companies in related research areas. The government also built the state-of-the-art National Experimental High School in the park, as a way to attract knowledge workers who value first-rate education for their children.

Park administration also awards over $4 million annually for innovative R&D projects, and recognizes successful projects with awards. Similarly, the park administration awards approximately $13 million each year to park organizations as a local match to develop strategic products and components (this amounts to almost 40 percent of the value of those projects).

As instructive as the Hsinchu Science-based Industrial Park is for the Palestinians, so too is the development of Tainan Science Park, on 640 hectares in the south of Taiwan. Hsinchu had the advantage of being close to Taipei. Tainan is more remote, though it is close to other population centers and to two national universities, a national institute of agriculture, the Asian Vegetable R&D Center, the Taiwan Livestock Research Institute, the Taiwan Sugar Research Institute, a metal industries R&D facility, and a marine laboratory. Those technology areas presumably will be bases for developing clusters in the park.

One of the government's first collateral investments is in a high-speed rail line to Tainan, to make it more accessible to labor and other businesses. That and other investments are expected to cost US$60 billion. In just one year, the park had commitments for 44 tenants – companies that met the park's criteria. Twenty-seven of those companies were branches of companies in Hsinchu.

Case 2: Aegean Free Zone Technopark

	Country	Turkey
	Focus	Electronics, automotive and aircraft components, textile and leather garments, food processing and packaging, machinery
	Established	1991
	Size	220 hectares
	Firms	400
	Jobs	N/A (Technopark employment not separated from free zone)
Components	• Warehousing • Customs facilities • Technology center • Interface with transportation nodes • Recreation and sports facilities, antique car museum	
Tenants	• 300 local investors • 100 foreign companies • Tenants include Delphi Packard Electric, FTC/Lockheed, Hyundai, Samsung	
Services	• Library, conference facilities, computer facilities, child care, health care, hotel • Research and testing facilities and equipment • Inventory and logistics management	
Organization	• Turkey's Free Trade Zones General Directorship authorized development of the Technopark on a BOT basis • A private development company, ESBAS, developed all infrastructure and facilities • 2 percent of ESBAS shares are held by the local municipality, chambers of commerce, and the regional development office	

The Aegean Free Zone Technopark (AFZT) was developed in 1991 on 220 hectares of land adjacent to both the Izmir International Airport and seaport, to serve as a gateway for the distribution of goods produced and assembled in the park to Western and Central Europe, Central Asia, and the Middle East, and the emerging market economies in Eastern Europe. AFZT's greatest strategic advantages are its location at the crossroads of two continents and its relatively cheap, yet productive, labor.

AFZT is interesting to discuss after Hsinchu because it is so much less advanced as a catalyst for R&D. Whereas HSIT was designed to pull Taiwan up the development trajectory, AFZT is conceived to exploit the current situation in Turkey, and by the strategic use of resources, improve business performance at the margins.

AFTZ is a government-driven initiative that was commissioned on a BOT basis. ESBAS, a private developer, is responsible for all on-site infrastructure and services, and provides standard factory shells, warehouses, storage areas, and office facilities on a lease basis. ESBAS also operates a Technology Center, which houses research and testing facilities, technical libraries, offices, meeting and conferencing facilities.

Under ESBAS' arrangement with the General Directorate of Free Zones, ESBAS receives revenues from the BOT concession that include 37 percent of all land rents; rents from advance buildings, which are in some cases shared with a third-party developer; 30 percent of free zone fees; and a variety of service charges for ESBAS-provided services.

However, the core activity of AFZT does not fit the IASP definition of science/ technology park. For the most part, it is a traditional industrial park housing 100 foreign and 300 local manufacturing and trading companies. It has the attributes of a typical free trade zone, with customs deferral during processing, ample warehouse space, and proximity to transport nodes. The Turkish government adds to that a 100 percent tax holiday on corporate earnings and on interest from savings held in zone banks. The government also prohibits strikes and lockouts in the zone.

As a way to respond to the pressures to move into the so-called "knowledge economy," AFTZ is building a technology center on site. This center includes a library, conference hall, computer lab, and research and testing facilities. It will provide U.S. University professors and business experts as technical advisers and liaisons with western R&D. It will help connect Turkish companies with foreign high-tech firms, and provide equity financing for new enterprise development. This is not a well thought out approach. Specific sectors appropriate for Turkey are not identified, and the role for universities, colleges, and research institutes is not well developed. In addition, mixing such a development with a traditional industrial park is not an optimal strategy – evidence suggests that the locational requirements of the two types of activities are quite different.

This assessment is not as much a condemnation of Turkish policy as it may appear. The Turkish government has stressed a non-spatial approach to technology development, which has some merit. In 1990, the Ministry of Trade and Industry created KOSGEB (Small and Medium Industry Development Organization) to help manufacturing enterprises solve technical and economic problems and attain higher levels of quality, technology and market opportunities. KOSGEB's services to small- and medium-sized enterprises are intended to:

- Provide training in modern management, marketing, and finance techniques (KOSGEB's Training Group organizes training programs, using both classroom courses and applied training in enterprises or laboratories)

- Disseminate advanced technologies

- Channel innovative ideas and inventions based on science and technology to production

- Render production compatible with international standards and conditions of competition in the EU and the Customs Union (KOSGEB serves as a qualified independent agent for weighing and analyzing the quality of goods, as may be required by legislation, sale, contract or letter of credit. KOSGEB has the status of a Supervision Company approved by the Foreign Trade Undersecretariat and offers supervision and expertise to industries about compliance with ISO and EU standards)

- Increase effectiveness in the national market and entry to new international markets (KOSGEB encourages businesses to participate in international fairs held in countries with an export potential. KOSGEB organizes trade fairs to introduce outside companies to new markets and buyers. KOSGEB provides information regarding tender notices, product and work inquiries, co-operation offers and international fair notices. It also provides Turkish business with information about modern marketing techniques, loans and Sectoral Foreign Trading Companies)

- Access international cooperation and information in technical and commercial subjects (KOSGEB serves as the national repository for data from the Euro Info Center, the EU's SME Information Program, and the BC-Net and

BRE business co-operation programs. Businesses in Turkey can access information from those sources relating to technology, legislation, importation/exportation, and joint investments)

- Encourage R&D by small and medium sized firms (KOSGEB provides 20 percent additional assistance for small- and medium-sized companies engaging in R&D)
- Forge relationships between small- and medium- and large industrial enterprises
- Expand co-operation between industry and university
- Encourage entrepreneurship (Entrepreneurs who have an idea for developing a new product or technology are allocated working space, are allowed to benefit from the R&D resources of universities, and get access to research grants)
- Make consultant expertise and labs available to improve inspection, testing and analysis of raw materials and finished products (KOSGEB has a stable of experts who are available to businesses, including engineers, economists, business administration graduates, and public finance experts. To help small- and medium-sized businesses raise the quality of their output, KOSGEB offers testing and analysis services at the: Non-Destructive Testing Laboratory, Chemical Analysis Laboratory, Mechanical Test Laboratory, Metallography Laboratory, Metrology Laboratory, Foundry Laboratory, and Plastics-Rubber Laboratory)
- Offer solutions to infrastructure problems

These activities include the kinds of efforts often undertaken by park administration. In the case of Turkey, they are offered centrally to all small- and medium-sized businesses.

Case 3: National Science and Technology Development Agency Science Park

	**Country**	Thailand
	Focus	Biotechnology, materials and material technology, electronics and computers
	Established	1999
	Size	32 hectares
	Firms	On-line by 2000
	Jobs	On-line by 2000
Components	• Park Main Building • The National Electronics and Computer Technology Centre • The National Centre for Genetic Engineering and Biotechnology • The National Metal and Materials Technology Centre	
Tenants	On-line by 2000	
Services	• Incubator, training center, housing, industry consulting • Technology transfer support • Standard testing and quality control, Technical Information Access Center • High-quality telecommunication and transport grids	
Organization	• Government-driven initiative • Network of NSTDA, thee separate national government research institutions • Affiliation with existing universities and training institutions • No private equity investment in park infrastructure development	

The Thailand story is similar to Taiwan's in that a national government agency developed a set of bold policies designed to develop basic R&D strength. Like Taiwan, the story is one of successful movement up the economic development ladder in the past decade and a half. Thailand's GDP per capita relative to the U.S. moved from 5.6 percent to 8.5 percent between 1980 and 1993.

The driving force behind technology development in Thailand has been the National Science and Technology Development Agency (NSTDA), established in 1992. Its objectives are to induce scientific and technological activity, implement programs to increase education, research, development, and engineering, and invest wisely to upgrade the technological capacity of the private sector and to commercialize new

knowledge. These goals are important because Thailand currently imports twice as much technology from abroad as it creates through indigenous R&D. The R&D that does take place is highly skewed toward the public sector: $9 out of every $10 spent on R&D is by the public sector. The ratios in Japan, Korea, and Singapore are 25 percent, 11 percent, and 42 percent public, respectively.

From the beginning, NSTDA identified three technology areas that were to receive special attention: biotechnology, metals and material technology, and electronics and computer technology. It developed and expanded national research centers in each of those areas. NSTDA also has financed almost 600 research projects, conducted by universities, government agencies, and private businesses.

Also from its inception, NSTDA established a network of universities and government agencies throughout Thailand, and worked closely with the Ministry of University Affairs to increase the capacity of those institutions. NSTDA also established the Thailand Graduate Institute of Science and Technology, which works with the five major Thai universities and universities aboard in conveying graduate courses and continuing education to Thais via distance learning.

One model program, begun by the government well before NSTDA was established, sent promising young scholars abroad for Ph.D.s, with the stipulation they return to Thailand afterwards. Those scholars establish and maintain contacts with colleagues at the world’s premier universities, and learn how cutting-edge research is conducted. Many of the top-level scientists in Thailand today – now often highly-placed in government – are graduates of that program. That program continues today, with 1,200 scholarships for foreign study in place. A follow-up effort is the Young Researcher Grant Project, which funds new graduate degree holders at Thai universities.

In 1996, the Thai government began the “Reverse Brain Drain Project,” using financial incentives to lure back to Thailand expatriate professionals living in North America, Japan, and Europe.

The most ambitious of NSTDA’s investments is its Science Park. That project is being developed on 32 hectares of land 20 km. from the Bangkok airport, adjacent to Thammasat University and the Asia Institute of Technology. The initial stage of the park will have four main buildings: a park headquarters and research buildings for the three national centers (measuring between 13,000 and 16,000 sq. m. each). Each of the national centers is expected to house about 200 researchers, working on joint university-government-private sector projects. NSTDA expects to work with the two nearby universities to tailor courses and training programs for the companies located on site. The projected cost of phase one of the park (not including land) is US$160.3 million.

Phase two of the park (up to 2002) was announced in 1997. This phase will include a software cluster affiliated with the National Electronics and Computer Technology Center. The project consists of a multi-tenant building for software-related companies, located on a 6 hectare plot of land. The cost for the building and equipment is estimated to be US$48.4 million. Projected rent would be US$5.34 per square meter – considerably less than the market rate. The development of the software park is linked to Thailand's version of the information superhighway – expanding and improving the internet for government and businesses.

The model for the park is to use the national centers as anchors, attracting private R&D labs into incubators, long-term leaseholds in custom buildings, and multi-tenant structures. In addition, the park will have a pilot plant to demonstrate state-of-the-art production techniques, a greenhouse, and training center. The park is being developed with world-class telecommunications facilities, as well as physical amenities that will make it attractive to prospective knowledge workers.

NSTDA is coordinating the provision of a broad range of services to park occupants – professional management, industrial consultancy, support for the acquisition and mastery of foreign technology, intellectual property services, standard testing and quality control, and access to technical information. The park will be built adjacent to a sports complex that contains rental housing and pre-K to high schools. Because the site is near two universities, there are university-related amenities nearby, including a hospital, libraries, restaurants, and entertainment.

The incentives that are provided include an exemption of import duties on machinery, equipment, and raw materials; an eight-year corporate income tax holiday; a 200 percent tax deduction for R&D expenses; and assistance obtaining visas for foreign technicians and their families.

Case 4: Shenzen High-Tech Industrial Park

	Country	China
	Focus	Information technology, bioengineering, new materials, optico-electro-mechanical integration
	Established	1996
	Size	13,000 hectares
	Firms	N/A
	Jobs	N/A
Components	• Shenzhen Science and Technology Park • China Science and Technology Council • Jingshan Nongovernmental Science and Technology Village	
Tenants	• Domestic companies • IBM, Epson, Olympus	
Services	• Fiber-optic network, calibration & measurement	
Organization	• Main policy-setting and oversight body headed by mayor of Shenzen and includes 19 different government departments • A subsidiary municipal agency, the High-Tech Office, manages, pland, and supervises ShiP on behalf of the municipality • A subsidiary of the High-Tech Office, the Service Center, provides individual investors with services and manages public assets and facilities within ShiP (including infrastructure development)	

The Shenzhen High-Tech Industrial Park was established in 1996 by the Science and Technology Commission of the Shenzhen Municipal People's Government. This "park" is different from the others we profile here because it is defined as a region, not just as a single circumscribed plot of land. The area referred to as a park is over 13,000 hectares in size, and includes several existing developments in Shenzhen, including the Shenzhen Science and Technology Park, the China Science and Technology Council, and Jingshan Nongovernmental Science and Technology Village.

The ShiP is essentially managed as a municipal project, in which the Mayor of Shenzen heads a 19-member government agency team that oversees the park. Specialized managerial and operating subsidiaries of the municipality deal with day-to-day park operations and service provision.

The purpose of the development is "to set up ... an experimental area for ... scientific and technological achievements, an area for the domestic and international cooperation of economy and technology; and an area for training personnel of high qualification." The park is situated near a major seaport, and its businesses are expected to value that proximity to increase their exports. Park management has targeted four sectors for promotion: electronic information, bio-engineering, new materials, and optico- electro-mechanical integration. The park also is being developed as a mixture of well-known Chinese and international businesses, and a combination of stand-alone and multi-tenant buildings. As with other parks, emphasis is being placed on natural and architectural beauty.

Economic activity in the region was already high, amounting to some US$15.2 billion. The park facilities are estimated to have added US$1.26 billion in output in 1996 and US$1.63 billion in 1997. More than 60 percent of the output from the region is exported. The Shenzhen economy is manufacturing-based, with some agriculture.

The R&D referred to in the Chinese context is mostly directed toward productivity enhancement, compliance with ISO and other trade-related standards (calibration and measurement), and on the adaptation and improvement of crops and livestock for higher yields, longer shelf life, and better appearance. The region's universities and colleges play an important role in training skilled workers and managers and in conducting very applied research. That type of R&D activity is high in the region. Park managers count 181 R&D organizations in Shenzhen and claim that 24 percent of the city's gross industrial output is from new and high-tech products.

The services and incentives being offered include a fiber optic network for internet and other telecommunication needs; a full two year and 50 percent eight year income tax exemption for certified high-tech enterprises; an 80 percent reduction in VAT paid by software firms in the region; a 10 percent R&D bonus paid to integrated circuit, PLC switches, software, and computer companies; personal tax exemption to employees who reinvest their profit distributions in the company; and a 5 year property tax abatement.

Another advantage of the park is its relatively low costs for rent and labor. In China, all land is rented at rates set by the planning bureau. The buildings can be built by local developers and then rented out, or built-to-suit by the investor, who thenhas the right of ownership, albeit on rented land. The rent for factories as of 1997 averaged approximately US$1.00 a month per square meter, and the market price for sale was US$217-302 per square meter. Semi-skilled labor in 1997 cost on average $0.60 per hour, and skilled technicians and managers were paid approximately $1.11 per hour.

Case 5: Technopark Kerala

	Country	India
	Focus	Information technology
	Established	1994
	Size	73 hectares
	Firms	35
	Jobs	2,000 professionals
Components	• Central services and administration building • Two speculative office complexes • Build-to suit plots	
Tenants	• Software development, hardware design and production, data capture, and networking • 20 local companies • 8 US, 3 German, 1 Swedish, 1 Chinese, and 2 Middle Eastern subsidiaries	
Services	• Internal power water distribution systems • Satellite earth station • Convention and meeting facilities • Library, cafeteria, guest house, club, shopping	
Organization	• Funded by Kerala State Government • Phase I developed as public sector investment • Phase II will be developed as joint venture project between public sector Technopark management and a private developer, who will pre-build and market 6 multi-enterprise buildings	

The interesting feature of this park, in the capital city (Trivandrum) of the south Indian state of Kerala, is its focus on information technology. Technopark Kerala (TK) was India's first science park, opened on 73 hectares of land in 1994. It now houses 35 companies, mostly from the IT sector (software development, network systems, data capture, and some hardware manufacturing). TK is a creature of the Kerala state government. The official "Information Technology Policy" document of Kerala states that: "Technopark [is established] as a location of international standards for Electronics and IT companies. Today the campus is the most advanced IT location in the country and has been a model for many other states to emulate .... "

While the park to date has been public-sector driven, park management is seeking to create a role for private sector developers to participate in the expansion of the park. In the development of Phase II, plans call for private development and marketing of 6 multi-tenant buildings through a joint venture arrangement.

The document also states that software technology parks/software complexes will be set up in other cities in Kerala. The state will build structures on a speculative basis for rental to private companies to rent. To facilitate the development of these parks/complexes, the state established an expedited process of development approvals. The state also specified a common set of incentives for the businesses:

- Exemption from the Pollution Control Act
- Priority in the distribution of electric power
- Exemption from state sales tax for seven years
- A subsidy for capital investment

There were also benefits for IT companies establishing their own electricity generators.

Businesses locating in TK have some TK-specific advantages in addition to those noted above: the rental rate is low compared to some alternative international locations – US$3.04 per square meter per month. Similarly, labor costs are reasonable, and the supply of qualified workers is ample. The park provides one-stop shopping for regulatory clearances, so startup costs are minimal. The location is well served by roads and an international airport is within a 20-minute drive.

TK's physical infrastructure currently includes two multi-tenant buildings. The first to be constructed contains 5,575 sq. meters in 28 modules, leased to 14 companies (approximately 360 sq. m. per company; approximately 40 sq. m. per company is in common space). It is fully leased. The second building consists of 37,160 sq. m. divided into 126 built-up modules, each measuring 182 sq. m. In addition to the multi-tenant buildings, TK makes available developed lots of at least 0.185 ha. in size.

Infrastructure also includes a satellite earth station to provide high speed and reliable data communication. Modern telephones and ISDN lines are provided. And internet connection is available through Videsh Sanchar Nigam Ltd. (VSNL), a private vendor.

Common facilities include a library, guest house, shopping and dining facilities, conference halls, an open-air theater, and club house with pool, tennis, and other amenities.

The development plan for TK specified a census of available training courses and of software professionals in the region. The government will "encourage the [software] industry to set up an institute of excellence in information technology," which would provide specialized courses using industry, Indian universities and colleges, and foreign institutions; provide infrastructure/facilities and expertise for applied R&D projects.

The government will also introduce IT as a specialized branch of graduate and post-graduate study in Indian universities, and as a technical course of study for diplomas in the polytechnics. All these courses will be linked to industry's needs. Various funds were identified to ensure quality in the development of these courses and in the linkages that must be established between the industry and academic/training institutions.

The multi-tenant space is available for 25 years per lease, at a cost calculated in one of two ways:

- $50,000 down payment per module (one-time), and approximately $118 per module annually, or

- Initial payment of $7,060 per module and monthly rent of $565 per module for up to three years; then the down payment would be required and the rent would be lowered.

After 25 years, the lease can be converted to freehold with a payment of $5,000 per module.

For companies wishing to build their own structure on a plot of land, the land is rented for 25 years at approximately $116,000 per hectare down payment (one time), and an annual payment of approximately $580 per hectare. As for the multi-tenant space, the lease can be converted to freehold after 25 years with a payment of 10 percent of the down payment. The rents noted above do not include a contribution for operation and maintenance and utilities. They are broken down as follows:

- For campus O&M: $353 per every 185 sq. meters of built up space
- For building O&M: $70.50 per module per month
- For water connection: $48 per module; $240 per plot
- For electricity connection: $24/KVA
- For telephone connection: $360 per line

Case 6: Kulim High Tech Park

Country	Malaysia
Focus	Advanced electronics, product testing, medical and scientific equipment, process control and automation, electro-optical applications, advanced materials, biotechnology
Established	1996
Size	1,450 hectares
Firms	27
Jobs	N/A
Components	• R&D and training facilities • Urban/residential cluster • Industrial facilities • Common areas
Tenants	• Primarily local conglomerates • International investors include Intel and Fuji
Services	• Municipal services • Nature park, theme park, golf course • Shared technology services
Organization	• Overseen by special entity – the Kulim Technology Park Corporation (KTPC), a subsidiary of the Kedah State Development Corpoiration • Public-sector KTPC subsidiaries operate a variety of activities, including integrated satellite townships and resorts • The park is integrated with existing training and educational institutions, and research institutes • A Private Power Utility supplies the park and its tenants through a concession arrangement with the KTPC

This technology park (Malaysia's first) officially opened in 1996. One of the major objectives in establishing the complex was "to propel the country towards realizing the goals embedded within Vision 2020 [a national S&T plan]." The park has been developed under the auspices of a specially created corporation – the Kulim Technology Park Corporation Sdn Bhd (KTPC) – with input on design and planning from the Japanese government. KTPC is a wholly owned subsidiary if the Kedah State Development Corporation (KSDC).

KTPC operates subsidiary companies in housing and rtesort development, and coordinates development activities with existing training, educational, and research institutions. While private participation in real estate development has been limited, the KTPC has granted a Private Power Utility concession that supplies the park.

The park occupies 1,450 hectares of land, divided into industrial, research and development, and residential-oriented uses (shopping, medical, education, and recreation facilities). The first phase of development consists of 250 hectares devoted to privately built and leased electronic manufacturing plants. The park is proximate to a large container port (25 km away) and a large international airport (36 km).

In Malaysia, as in other countries at similar levels of development, “high tech” companies are broadly defined as those that produce or use new and emerging technologies. The Malaysian Ministry of Industry, KSDC, and KTPC have identified nine industries to promote:

- Advanced electronics manufacturing
- Product testing and analysis services
- Medical/scientific instrument manufacturing
- Process control/automation equipment manufacturing
- Optical/electro-optical applications
- Optoelectronic equipment manufacturing advanced materials manufacturing
- Advanced materials manufacturing
- Biotechnology R&D
- Other R&D contract services

Companies in these areas of application, as certified by the Malaysian Industrial Development Authority, and satisfying the following criteria, are invited into the park and offered incentives:

- Within the first three years of operation, annual R&D expenditures at the plant must be at least 1 percent of gross sales

- 7 percent of the plant’s workforce must be science and technical graduates of programs/institutes/schools, not including technical workers with certificates and degrees

Businesses locating in the park are eligible for a wide range of incentives, from the local and state governments, the federal government, and the KSDC. The incentives pertain to investment, general tax status, regulations, R&D, and training. For example:

- A full five or ten year tax exemption (depending on the nature of the project), an investment tax allowance of 60 or 100 percent on qualifying capital expenditure for five years (depending on the type of project), to offset up to 100 percent of statutory income for each assessment year, with a carry forward of unutilized allowances

- Assistance in obtaining visas for foreign scientists or highly skilled personnel

- Approval to open foreign exchange accounts

- Double tax deduction on expenditures incurred in approved research projects

- Research allowance of 50 percent on qualifying R&D expenditures for 10 years (based on 70 percent of statutory income level)

- Industrial Building Allowance for buildings used for R&D and technical/vocational training

- Exemption on import duties and sales tax on equipment used in R&D

- Custom built building available for rent with purchase option

- Joint venture options for selected companies with Kulim Technology Park Corporation

- Lower water rates for any amount of water used for the first three years of operation

- Assessment rates of only 8 percent for the first three years of operation

- An investment tax allowance of 100 percent for ten years for companies providing technical or vocational training, up to 70 percent of tax liability

- Exemption from import duties, sales taxes, and excise duties on machinery/equipment, materials, raw materials and samples used for purpose of training, for companies that provide technical or vocational training

Incentives are provided not only to the businesses in the park, but also to vendors outside the park that provide needed goods and services to park organizations. This backward linkage program is promoted through published lists of required inputs in the park; opportunities to attend seminars and workshops about doing business in the park and criteria for locating on site; financing packages from local banks; and a subsidized multi-tenant building in which vendors could locate. The vendor program is a joint venture between park management and the local municipalities.

3. The Technology Context

3.1 Overview

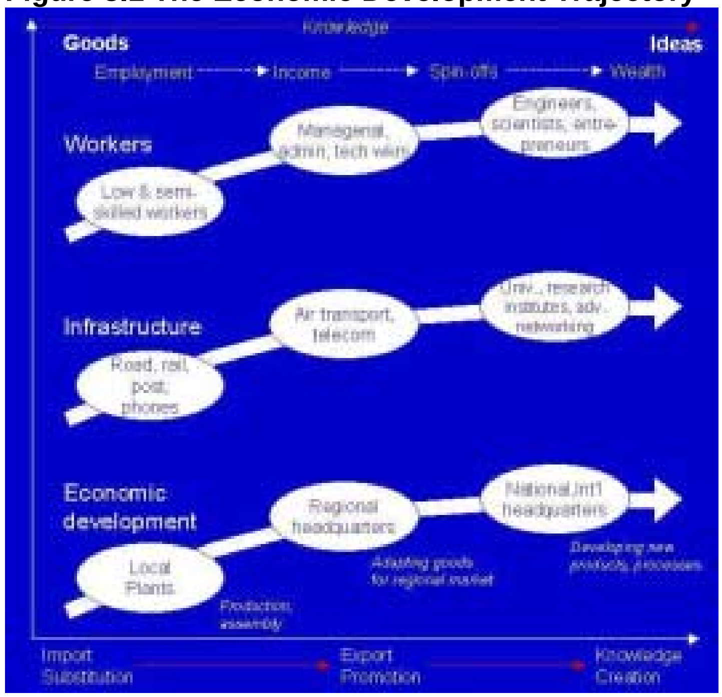
The economic realities of the next millennium will be quite different than they were in the 20th century. While there still will be leading and lagging countries, all nations and regions will be required to have a modicum of technological sophistication, or risk falling farther and farther behind. Indeed, economists have amply documented that the very logic of the knowledge economy of the 21st century is for increased disparities to develop between the technological "haves" and "have nots." In short, growth in the coming decades requires concentrations of knowledge resources.[1]

This reality should present considerable concern for West Bank/Gaza. By many indicators, the region is a technological "have not." In terms of Figure 3.1, this means the economy would be stuck on the left side of the development trajectory. Chapter 2 contained some glimmers of hope for West Bank/Gaza, however. The picture it painted of the economy was one filled with contradictions. For example, its level of GDP per capita suggests a much lower standard of living than do data on wage rates and productivity, and the dearth of technological infrastructure is counterbalanced, to some degree, by some technological sophistication among workers. Based on these contradictions, noted economists have concluded that West Bank/Gaza is underperforming.

---

[1] For example, see Edward Feser, Harvey Goldstein, and Michael Luger. *At the Crossroads: North Carolina's Place in the Knowledge Economy of the 21st Century*. Prepared for NC Alliance for Competitive Technologies and Board of Science and Technology, April 1998, and Michael I. Luger "Technology Development Programs, Intergovernmental Relations and Balanced Regional Growth." In Anita A. Summers and Lenfranco Sen, editors, *Comparisons of Urban Economic Development in the U.S. and Western Europe*. Washington, DC: The Urban Institute Press, 2d edition, 1999.

Figure 3.1 The Economic Development Trajectory



This technology context provides the justification for the KTDC proposal. It is conceived as a very different model than traditional industrial estate development. It is intended to bridge the technology gap in West Bank/Gaza – a chasm that exists not only in time (between the old realities of the 20th century and the challenges of the 21st), but also in space, since the levels of technological sophistication are so different between the West Bank and Israel, which are geographically such close neighbors.

This chapter begins by presenting, in some greater detail, why knowledge creation is so important in the new economy of the 21st century. It then explains where West Bank/Gaza's economy is today in terms of its ability to create knowledge. It presents vignettes of Israel and Singapore, as examples of countries that have used technology to catapult up the economic development trajectory. It ends by showing how the KTDC concept can move West Bank/Gaza across the knowledge divide.

3.2 Knowledge Creation

Over forty years ago, economists demonstrated that technological change is a major contributor to economic growth. More recently, research has shown that technical change can be induced by research and development (R&D) activity and that the growth prospects of particular cities and states depend, to an increasing degree, on the condition of their 'knowledge infrastructures.' R&D is critical to a knowledge-intensive, technology-based economy. It supplies the new ideas and products that keep businesses on the leading edge of their respective industries, as well as the innovations that lead to productivity-enhancing improvements in process technology.

Regions with strong knowledge bases and the capacity to innovate generate new productive activity from within. They also attract additional technology-based enterprises and workers from outside, which provides further resources and impetus for improvements in schools and universities. That relates to what has become known as endogenous growth theory:

> *"As the skill or knowledge base of a regional labor force is perpetually enhanced from within it becomes a continuous internally created source of competitive advantage . . . for an economic system."*[2]

Endogenous growth theory applies as much to West Bank/Gaza as it does to Israel, the United States, or any other economy. R&D can help provide a competitive advantage for its existing industries that are subject to increasing pressure from manufacturers elsewhere. R&D may lead to process innovations, enabling goods to be produced at lower unit cost, and to the development of new products. If existing goods are produced more capital intensively, for example, there would be less labor input per unit, but if market share increased, there could still be more employment, but at a higher wage.

[2] R. Stough. "Introduction," Annals of Regional Science 32 (1), 1-5, 1998. See also R. E. Lucas, "On the Mechanics of Economic Development," Journal of Monetary Economics 22 (1), 3-42, 1988.

This point can be illustrated for the state of North Carolina in the U.S., which, like West Bank/Gaza, has a prominent textile and apparel sector. Value added in textile production has continued to grow since the mid-1980s, even though employment has been cut. Between 1989 and 1994, the growth of real gross state product (GSP) in that industry averaged 5.3 percent annually, over twice the average for all manufacturing in the state, while employment fell 1.5 percent annually. In short, the introduction of new equipment, and presumably, better methods, has kept the industry afloat in North Carolina. Another example of R&D in a traditional industry is the introduction of numerically-controlled machines in the apparel industry. Garments are fabricated with less labor input, but the automation has kept the manufacturers viable in world markets, muting the loss of employment in that industry.

In North Carolina, as in other places (including Israel) R&D also has led to new products with substantial new employment in such sectors as pharmaceuticals, software, and electronics. Increasingly, states, regions, and countries measure the success of their economies in terms of new enterprise formation (start-ups and spin-offs), not just in terms of jobs and investment. IPO (initial public offering) has become the buzz-word of the 1990s and will continue to get attention into the next decade.

The location of the R&D is important. Several researchers have demonstrated a distinct R&D impact gradient: the economic benefits of research and development are greater the closer one is to the site of the innovation. That is important because it makes the decision between developing and buying technology clear: indigenous activity has spillover benefits for the economy. In addition, economies that have branch plants that import process and product innovations from a headquarters location are often unstable: the mother company or headquarters will move production from the satellite when labor conditions or other features of the economy change.

3.3 Knowledge Creation in West Bank/Gaza

Elsewhere in this report we show how West Bank/Gaza lags other mid-level economies in K-12 education, the quality of post-secondary institutions, the science and technology literacy of its population, and the degree of connectedness of its businesses and public to the internet, to name just a few of the typical indicators of what might be called "knowledge inputs." Most striking, for example, is the fact that in 1997, only 4 percent of the population had access to a computer and 20 percent had a phone line.[3] In March 1999, there were 136,494 applicants waiting for leased lines in West Bank/Gaza, almost the number of working lines (177,684).[4] A related problem is that the cost of an internet connection is high.

An economy with low levels of knowledge inputs also will have low levels of knowledge outputs, including new technologies, measured, for example, by patents and copyrights and new technology start-ups and spinoff companies.

We noted above that high tech inputs are important for an economy not just when they result in high tech products (such as advanced materials, sophisticated instruments, or biotechnology) but also, when they enable traditional products to be produced more efficiently. In a recent review of the major industrial clusters in West Bank/Gaza, MOPIC concludes that the textiles, apparel, pharmaceuticals, stone cutting/shaping/finishing, and tourism sectors all would benefit from the application of information technology. Those sectors are the most important economic activities in the West Bank. Textile and wearing apparel, for example, accounted for almost 30 percent of all employment in West Bank/Gaza and 22 percent of value added. However, the future of the sector is in doubt, given the ratio of cost to value delivered, compared to Egypt and Jordan, as well as countries outside the region. West Bank/Gaza has failed, with a few exceptions, to progress to contracting and the application of more sophisticated production processes that would increase productivity. MOPIC recommends the industry be saved by investing in information sharing technology, and developing better strategic sourcing and distribution capacity (inter alia). Similarly, the Ministry recommends better information generation and distribution on the marketing side of the stone cutting, shaping, and finishing, pharmaceutical, and tourism industries.

[3] West Bank/Gaza IT Strategy Project Interim Report, p. 15
[4] *Ibid.*

3.4 Models for Technology Development

A country's economic development fate is not sealed; it can be altered by strategic and sustained government initiative. Israel and Singapore are two cases in point. Both were relatively poor, emerging countries through the early 1960s. Today they are among the world's leaders.

Israel

Since its birth in 1948, Israel has placed special emphasis on advanced education and scientific research, in part because it did not have an abundance of marketable natural resources (for example, oil). Israel invested heavily in military technology, for strategic reasons, and agriculture, to ensure self-sufficiency and to develop an exportable commodity. Both of those sectors now are yielding peace-time dividends, in the form of new commercial technologies. Military R&D has produced many commercializable applications in communications, software, and electronics. Agricultural research has produced advances in hydrology and the biosciences.

As a consequence of its investment in R&D, Israel had the highest GDP growth rate among OECD economies in the 1990-1995 period, averaging approximately 6 percent per annum. Its per capita GDP, $16,800, placed the country twenty-first among more than 200 nations.

Israel's economy quickly moved from traditional agriculture to high technology. Total sales by high-tech industry increased by 10.7 percent (to $7.2 billion) between 1996 and 1997, and exports of high tech-related goods and services jumped by 14.2 percent during that same period (to $5.6 billion). In 1996, high tech output accounted for more than 6 percent of the nation's GDP, and high tech exports represented 15 percent of all exports.

Israel's strength in science and technology is also well reflected by its position in the international scientific community. It boasted the first and third place in the world, respectively, in the number of scientific publications per capita and the citations of scientific publications by Israeli scientists per capita. In addition, Israel's investment in R&D (2.1 percent of GDP) and number of engineers (135 for every 10,000 citizens) are among the highest in the world. Figure 3.2 summarizes some of these accomplishments.

Figure 3.2: Facts about Israel's Science and Technology Presence

Foreign investment in high-tech industries has almost quadrupled between 1995 to 1996, reaching $850 million.

About 21 percent of all undergraduates and about 50 percent of all doctoral candidates specialize in **science, engineering, and medicine fields**.

Israel boasts the first and third places in the world, respectively, in **the number of scientific publications per capita** and **the citations of scientific publications by Israeli scientists per capita**.

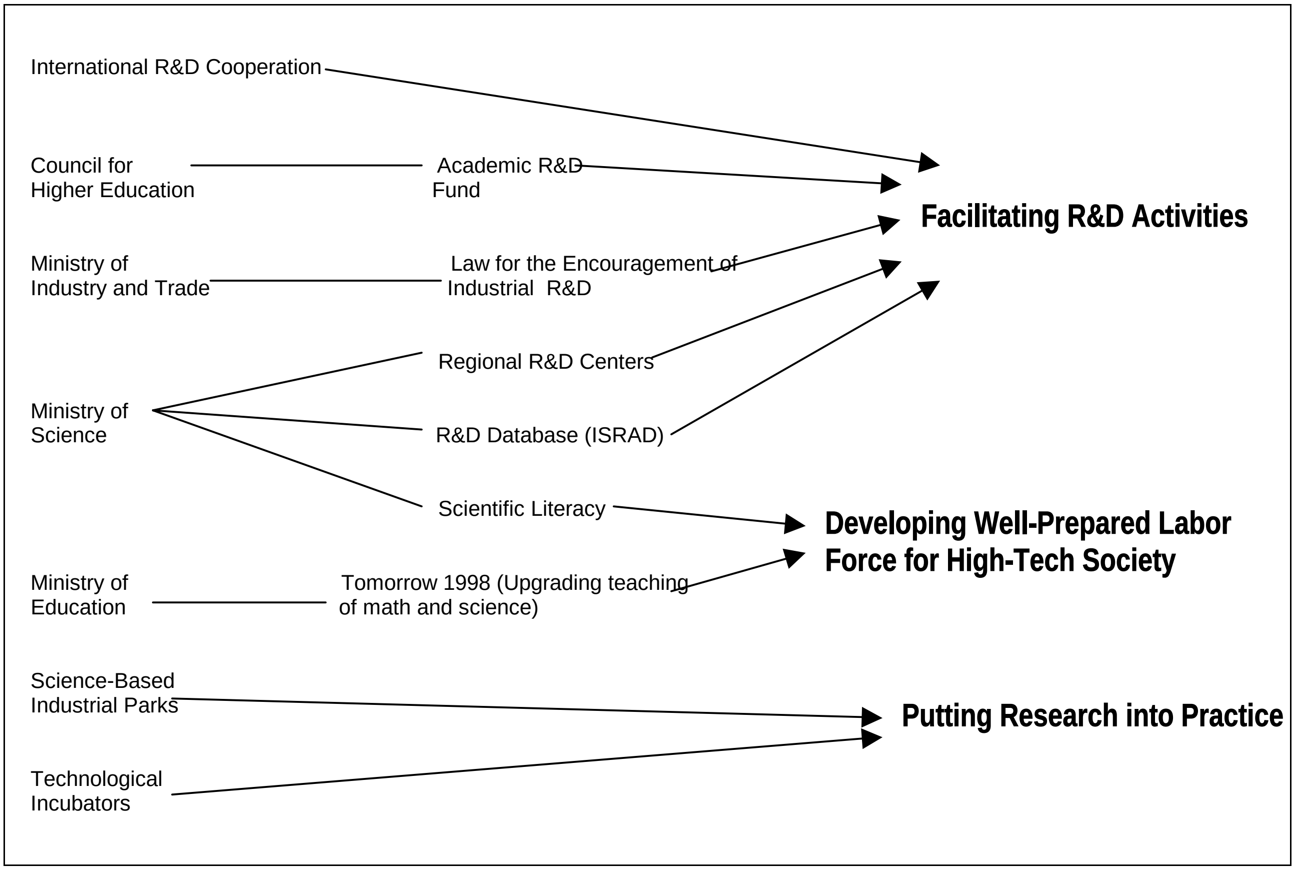
Israel's **investment in R&D**, 2.1 pecent of GDP, and **the number of engineers**, 135 per 10,000 citizens, are among the highest in the world.

Source: Ministry of Foreign Affairs Web Page: www.israel.org/mfa

Institutional innovations. To give science prominence within the apparatus of national government, the Knesset established offices of chief scientist in thirteen major ministries. Those chief scientists, individually and as part of a Forum of Chief Scientists, advise their respective ministers and the Knesset on matters related to science and technology policy. They also promote R&D and help to connect their units with similar agencies in other countries. The Knesset also established a separate Ministry of Science and Technology to improve, consolidate, and expand technological research. The Ministry provides advice to other ministries on science and technology. The Minister of Science and Technology chairs the ministerial committee on science and technology policy.

Strategies. Israel's science and technology policy has three major pillars: facilitating R&D activities, putting research into practice, and developing a well-prepared labor force for high-tech society. These are shown in Figure 3.3 and discussed below.

Figure 3.3: Players, Programs and Strategies in Israel's Science and Technology Policy



- *Facilitating R&D.* Israel has recognized the importance of basic academic research in the country's technological advancement. The Planning and Budgeting Committee of the Council for Higher Education oversees the distribution of some $150 million in public research funds every year. In addition, the government spends some $70 million each year (for some 2,000 projects) as the Israeli part of external grants that require international collaboration. The Israeli government also has established a supercomputing center at Tel Aviv University to facilitate R&D activities in universities, research institutes, and industries.

  The lynchpin for industrial R&D in Israel is the Law for the Encouragement of Industrial Research and Development, which is administered by Office of the Chief Scientist of the

Ministry of Industry and Trade. The law was created in 1984 to promote the development of science-based industries, specifically, by encouraging companies to invest in new product and technology development projects. In 1998 alone, the OCS distributed $500 million in grants to about 800 high-tech companies, including large corporations and small startups. Those grants, for up to 66 percent of a project's cost, are only repaid if the project generates royalties. The high tech sector has become so large in Israel that this grant approach has become difficult to administer; policy is shifting more toward tax incentives.

Even though Israel, like West Bank/Gaza, is a small country, there are regional differences in both the types of problems that exist, and the potential for solutions. The Ministry of Science supports five regional R&D centers that are intended to bring the science and engineering expertise within each region to bear on local problems.

Finally, Israel has established bilateral R&D cooperation agreements with 26 countries including the U.S., U.K., France, Germany, Japan, and South Korea. The agreements aim to develop continuous and steady working relations with major high-tech countries and to gain access to foreign funding sources by facilitating joint ventures in R&D. One of the most important recent developments is that Israel has become an Associate Member of the European Union R&D Program. The budget of the European program is approximately $16 billion for five years, and 104 projects involving Israeli researchers have already been approved.

- _Putting Research into Practice._ One of major tasks of the Chief Scientist is to encourage the commercialization of new technologies developed in university laboratories. The establishment of science-based industrial parks is Israel's main strategy to bridge academics and industries. Often located near research universities, the parks provide fledgling science-based industries with physical services and facilities as well as access to the intellectual capital of faculty researchers. This strategy has resulted in a close academic/industry relationship and great commercial successes. Many universities have set up spin-off firms in partnership with local companies to commercialize their research ventures. A very high proportion of university faculty advises industries on technical, financial, and managerial matters. The share of university research funding supported by the local industry is about 9 percent as compared with 6 percent in the U.S.

Another important strategy to put research into practice is developing technological incubators. The first of this kind in Israel was introduced in 1991 to encourage the development of new innovative ideas. Incubators assist individual entrepreneurs in recruiting R&D staff and investment capital to complete their projects. Incubators also provide physical facilities and managerial guidance. Israel has 26 incubators throughout the country. More than 200 projects are now being conducted in incubators, and over 300 firms have graduated from the program.

- *Developing a Well-Prepared Labor Force for High-Tech Society.* Compared to other industrialized nations, Israel is poor in physical capital. However, the lack of physical capital is well compensated by its rich human capital. From the beginning of the country in 1948, high-skilled human resources have provided Israel with a comparative advantage in skill-intensive products. Israel has exploited this advantage through time and now becomes a powerhouse in technological and scientific manpower. Several programs currently implemented for manpower development are described, in turn.

  Tomorrow 1998, initiated by the Ministry of Education in 1992, focuses on upgrading the teaching of mathematics, science and technology. Israel recognized the importance of technical education in maintaining and enhancing national competitiveness in the future. The leaders of Israel believed that techniques dealing with modern tools should be introduced to children as early as possible, and that computers needed to be viewed along with reading, writing and arithmetic as a core element of education. A capital effort provided schools with computers to help create a technology-saturated environment. Today, virtually every student in kindergarten, primary and secondary schools uses computers and computer-related technologies.

  The Ministry of Science emphasizes the development of scientific literacy among children and adolescents. To make

Israeli youth understand scientific concepts and the new world where they live, the Ministry provides financial support for science museums and educational projects.

Singapore

Singapore is another country that is relatively small ($94 billion GDP in 1996), but prosperous, due largely to strategic investments in science and technology. With a per capita GNP of $24,700 in 1995, Singapore ranked fifteenth in the world; in terms of purchasing power, Singapore actually ranked above the United in 1998. No country had a faster growth rate in GNP per capita since 1960: 8.5 percent per annum. That was achieved with low inflation – only 3 percent for the same period. The economy is well-diversified: almost 30 percent of GDP originated in the finance sector and 23 percent is from manufacturing. Singapore also is one of the world's most open economies, with a trade-to-GDP ratio of 273 percent.

When the British left Singapore in 1963, it was a poor region (Singapore was a part of Malaysia until 1965) with no natural resources or significant industry. Through favorable regulations and tax policies, Singapore managed to attract manufacturing facilities of major multinational corporations, such as Texas Instruments, Motorola, Philips, and IBM. Good training and education programs allowed those companies to increase their productivity, and as workers became more highly skilled, the companies expanded their product development activities in Singapore. Figure 3.4 summarizes the success of the Singapore economy.

Figure 3.4 Facts about Singapore's Science and Technology Presence

About 10 percent of science and technology graduates **pursue R&D as a career**.

About **15 percent of GNP is dedicated to R&D.**

In 1997 alone, **a $100 million venture fund** was launched, with which more than 40 companies have been supported.

Singapore has a fully configured **Information Superhighway**

Sources: National Computer Board Web Page: regent.ncb.gov.sg and National Science and Technology Board Web Page: irdu.nus.sg/NSTB

The science and technology policy scheme in Singapore is very centralized. The National Science and Technology Board (NSTB) is at the center of science and technology policy in Singapore. Established by an Act of Parliament in 1990 as a statutory board under the Ministry of Trade and Industry, the NSTB has developed Singapore's excellence in selected science and technology fields and enhanced national industrial competitiveness.

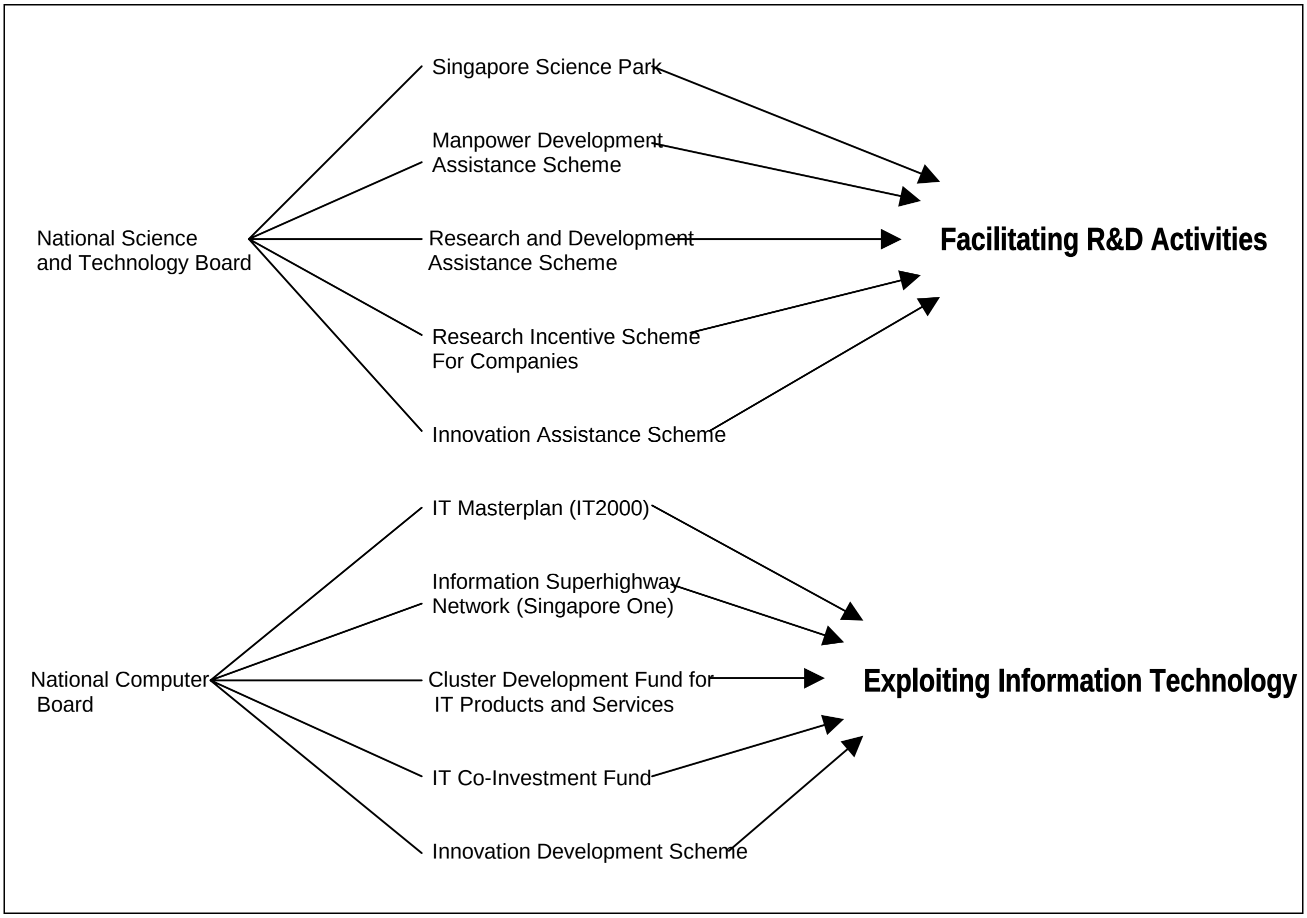
The National Computer Board (NCB) is another very important organization initiating IT policy and development. NCB's mission is to exploit IT extensively to stimulate the economic growth and competitiveness and to improve the quality of life.

Strategies. Singapore has two major strategies in science and technology policy -- supporting R&D and exploiting IT. Its two key government agencies, NSTB and NCB, are leaders in those efforts. Figure 3.5 summarizes the key elements of science and technology policy in Singapore.

- *Facilitating R&D.* To support the growth of R&D in Singapore, NSTB has provided funding for R&D, established R&D centers, developed the R&D workforce, and upgraded science and technology infrastructure. NSTB assessed the needs of science and technology in Singapore and developed a National Science and Technology Plan (NSTP) to provide national direction for science and technology development. The plan aims to increase the total expenditure on R&D up to 2 percent of GDP and the number of research scientists and engineers up to 90 per 10,000 labor force by the year 2005. The main thrusts of NSTB's science and technology development are described below.

  Singapore has developed some of the best telecommunications and transportation infrastructure in the world to enhance its competitiveness. A case in point is the "Technology Corridor," where the National University of Singapore, the Nanyang Technological University, the Singapore Science Park, the Singapore Polytechnic Institute, and a growing number of research institutes are located. The Singapore Science Park is the cornerstone of the Technology Corridor. Launched in 1984, the park has attracted research facilities of hundreds of local and foreign companies, including Exxon, Sony, Seagate, Mentor Graphics, and Genelabs. The

Figure 3.5: Players, Programs, and Strategies in Singapore's Science and Technology Policy



Science Park is still expanding; it is expected by 2001 to house an Innovation Center and a Technology Assistance Center to support startup companies. The park will also include a TeleTech Park, the first facility in Asia focusing on research and development in telecommunications.

Besides the physical infrastructure, NSTB also has focused on soft infrastructure. Technet, an electronic communications network linking researchers and industrialists in scientific community, was set up in 1992. The network interconnects all tertiary institutions and commercial R&D organizations. It links researchers in Singapore with international research networks and encourages international cooperation with their foreign counterparts.

NSTB has made substantial progress in stimulating industry R&D activities. In 1997 alone, $1.14 billion was committed to R&D, which is expected to create approximately 1,400 jobs for research scientists and engineers. In the same year, gross expenditure on R&D increased by 17 percent, which accounts for 1.47 percent of GDP. The private sector led this growth by contributing 63 percent of gross expenditure on R&D, in large part responding to two programs that NSTB developed to support industry R&D activities:

- The *Research Incentive Scheme for Companies* (RISC) is a grant program to support companies that plan to develop R&D facilities in Singapore. In 1997, 28 RISC grants were awarded on a reimbursement basis. The selected companies receive grants covering up to 50 percent of their incremental R&D spending for 5 years.

- The *Research and Development Assistance Scheme* (RDAS) is a funding mechanism to encourage industrial R&D activities and to raise the level of technological know-how in Singapore. RDAS is different from RISC in that it is designed to finance specific R&D projects by companies that already own R&D facilities in Singapore. The selected companies receive up to 50 percent of the total R&D project costs. The RDAS fund does not require repayment; however, as with Israel's R&D support program, successful pay the NSTB a token royalty, approximately 0.5 percent to 3 percent of sales revenue of the product developed.

The development of science and technology in Singapore was triggered by multinational corporations. Those companies began arriving in the 1960s and 1970s. The sophisticated technologies and skills they brought with them set standards and then diffused to indigenous companies. The multinational corporations also have provided entrepreneurs – professionals who have left the companies to establish new enterprises. Creative Technology and Aztec Systems, leaders in the world's multi-media sound add-on card market, were founded in that way. (A similar process is underway in the Research Triangle region of North Carolina).

The NSTB has facilitated innovative activity through an *Innovation Support Framework,* which has three distinct programs:

- The *innovators assistance scheme* (IAS) is designed to help innovators bring their innovations to market. In 1997 alone, a $100 million venture fund was launched, and more than 40 companies including 20 high-tech startup companies were supported.

- The *patent application fund* (PAF) aims to encourage organizations and individuals to register their new innovations and inventions and establish intellectual property rights.

- The *innovators club* is a social forum providing opportunities for innovators and researchers to exchange ideas, information, and experience.

In addition, NSTB's Technopreneurs Assistance Center and Technology Fund provide seed funding and other supports for startup companies.

Singapore was successful in attracting the multinational high tech companies because its supply of well-educated and trained technicians and engineers was better than other countries in the region (Malaysia, Thailand, and Indonesia). Today, about 10 percent of science and technology graduates pursue R&D as a career, but NSTB wants to expand the size of this workforce further. RISC and RDAS provide funding to train scientists and engineers as a part of their programs. In addition, the Manpower Development Assistance Scheme (MDAS) provides grants for postgraduate degrees and job training. NSTB, in conjunction with other agencies, also supports international R&D workforce recruitment under the Foreign Researchers Recruitment program to attract well-qualified and experienced foreign researchers.

▪ *Exploiting Information Technology.* As the statutory board responsible for IT policy and development, NCB has designed and implemented many programs to enhance Singapore's economic competitiveness and quality of life. NCB developed five strategic goals for the next century: developing a global hub, improving the quality of life, boosting the economic engine, linking communities locally and globally, and enhancing the potential of individuals. Major programs to implement these goals are described below.

Singapore developed an IT masterplan for the 21st century referred to as IT2000. IT2000 plans to develop nationwide high-speed fiber optic information infrastructure interconnecting computers in every home, school, and office. It will provide a better environment for both business and daily lives. The plan is also expected to turn Singapore into a global center for science and technology and a critical hub in global information networks and electronic commerce.

A key milestone toward realizing IT2000 is the completion of an information superhighway network, Singapore One. That will support voice, data, audio and video transfer, far exceeding the bandwidth of current Internet technology. Users (homes, businesses, public agencies and schools, institutes, libraries) will be connected to the network via highly sophisticated Asymmetric Digital Subscriber Line modems and Hybrid Fiber Coaxial connections. In addition to its high-capacity physical infrastructure, its applications will create an environment where interactive audio, video, and multidimensional graphics are common in everyday lives. Applications and services available through Singapore One include:

- On-line shopping, home banking, ticketing and other electronic commerce transactions
- News and information on demand including library services
- Multi-user on-line games
- Entertainment on demand such as video-on-demand and music-on-line
- Government services
- Videoconferencing and business to business services

NCB has established a $200 million Cluster Development Fund to facilitate the development of pioneering IT products and services, to re-educate IT professionals and users, and to develop information infrastructure. NCB has also developed various assistance schemes for local IT companies to upgrade and exploit their IT capabilities. Three examples of assistance schemes:

- The Innovation Development Scheme encourages local IT companies to develop capabilities for the innovation of new products and processes.

- The IT Co-Investment Fund supports investments in foreign companies to obtain new technologies.

- The Initiatives in New Technology program encourages workforce development in R&D, product design, and the application of new technologies.

The NCB Scholarship Program provides financial support for promising young students in IT-related fields. The scholarship package includes all the costs for studying for up to six years at prestigious institutions in the U.S., U.K., Canada, France, Germany, and Japan. Today, hundreds of young IT professionals are studying cutting-edge technology at leading universities in each field.

3.5 Lessons for West Bank/Gaza

West Bank/Gaza's industrial policy cannot be built only around traditional low-skilled activities. It must be consistent with the requirements of the knowledge economy. The challenge is to build on the existing strengths in the region, while at the same time developing new capabilities to move the economy along the development trajectory.

The KTDC can be a bridge to the 21st century – spanning not only the old and new economies within West Bank/Gaza, but also, the gulf between the more developed economy in Israel and the West Bank.

In both the Israeli and Singaporean cases, success came from concerted activity across many areas of policy. Similarly, in West Bank/Gaza, the KTDC cannot be the only innovative strategy. Its development must be linked with the strengthening of K-12 education, improvements in the post-secondary education system, creation of appropriate intellectual property laws, efforts to repatriate talented Palestinians from abroad, the availability of funds for R&D and new enterprise development, and more.

Yet, the KTDC can be a beacon – a demonstration project that incorporates different elements of the new economy. In doing that, its feasibility and success should not be measured using traditional short-term metrics, but rather, in terms of longer-run and somewhat less tangible measures.

Within this technology context, the long-term objectives for the KTDC should include:

- Creation of jobs requiring technical skills, and the provision of training and education programs to provide those skills

- Opportunities for R&D, individually by companies, between companies and universities, and among consortia of companies

- Development of specialized expertise that could lead to new products and processes in emerging technology areas

It is not reasonable to expect the West Bank to be as dynamic as Israel or Singapore at first. The foundation needs to be built to achieve that dynamism. The creation of technology centers around information technology, networking, and engineering/ maintenance will begin to build critical masses of expertise from the universities and businesses in the area. The development of a training facility will provide the infrastructure to create the necessary human capital. The construction of a high-quality multi-tenant building and land for private construction – along with the proper financial incentives – will attract businesses that are technology leaders, that can be emulated by local companies. The availability of attractive and inexpensive space will lure back expatriate Palestinians and invite Israeli capital to form joint ventures and other partnerships with Palestinians.

In the first few years of the KTDC operation we are likely to see technology being applied – in adaptation of software, in networking and repair services, and in call centers. But over time, the programmers will learn how to write their own new programs; the repair technicians will invent some new gadgets. These activities will enhance the competitiveness of West Bank/Gaza in the global marketplace, leading to more exports. A momentum will develop, with new enterprises and new and better jobs.

The last important feature of the new policy is flexibility. The KTDC must be able to adapt to changes on the supply and demand sides. This can be accommodated by reprogramming space in a multi-tenant building, reallocating land for new uses, developing new instructional and training programs in the universities and technical schools, and building a technology center with a different focus. At this time, we believe information technology is the proper target for policy. But in the future, biotech, for example, may mature in West Bank/Gaza and could be developed as an additional component of the complex.

4. The Human Resources Context

4.1 Human Resources and the Knowledge Economy

In a knowledge-based economy, human resources (as measured by levels of skills, knowledge, and creativity of the population, and the system that teaches and develops them) are the leading factor in economic growth and development. This is true for any high-technology industry, and particularly relevant for information technologies. The "human resources context" of interest to a region seeking to develop these industries includes the:

- Technical competencies and knowledge of the incumbent workforce
- Formal system of schooling (from pre-school through post-graduate education) that prepares young people for work
- Training system (both public and private) that upgrades skills and transmits new knowledge
- Labor market information system that connects the education and training systems with the students' employers
- Social infrastructure and cultural context that facilitate informal learning, knowledge, and technology transfer.

Information technology represents an opportunity – given its growth rates and shortage of skilled workers - and a challenge, because the competition for business in this sector is intense. A 1997 World Bank study concluded that "the changing patterns of worldwide [IT] sourcing—due to rapid technological change and shifting market requirements—provide new opportunities to developing countries to upgrade their industries and to compete effectively in the international markets."[1] In order to understand the potential opportunities that technology-based industries represent, it is thus important to understand how West Bank/Gaza's human resources and education and training systems measure up to its potential competitors, what are West

[1] Nicholas Vonortas and Stratos Safioleas, Strategic Alliances in Information Technology in Developing Country Firms: Evidence and Policy, PSD Department Occasional Paper No. 29, World Bank, 1997.

Bank/Gaza's strengths, and how can West Bank/Gaza's competitive position be improved?

In broad strokes, the TSG team's field mission suggests the following shortcomings in the system as a source of a technically qualified work force:

- The educational system is strained by increasing enrollments, and this situation is likely to worsen
- Basic and secondary teachers are insufficiently prepared and supported for a technology-driven economy
- Problem-solving skills of students are relatively poor
- Basic and secondary education lacks a clear philosophy
- Families and students prefer academic over vocational studies, four-year over two-year colleges, and humanities over sciences and technology—all of which deter enrollments in high-demand IT fields
- The economy currently employs a low proportion of skilled workers and technicians
- Relationships between academia and business and industry are weak
- Most colleges are quite dependent on the generosity of foreign governments or wealthy expatriate Palestinians for computers, labs, and scientific and technical equipment
- There is no systematic and regular procedure of gathering information about skill needs

However, the existing system also has strengths and potential:

- The weaknesses of the educational system are recognized, debated, and are being addressed through a number of recent reforms
- There is strong interest in learning and borrowing (with modifications) from other systems in order to improve quality (e.g., the adoption of Scottish standards, modularization for

some programs, and the planned introduction of a German-inspired vocational training system in Nablus)

- There is a growing core of college and university technical programs in computer and IT-related fields
- Women are increasingly enrolling in technical programs, particularly in computer fields
- Literacy rates are high compared to most Middle Eastern countries
- Palestinian students (and culture) are quite entrepreneurial
- There are some visionary leaders within the educational system
- There is an expressed desire to build closer ties with industry and to focus on preparing youth for jobs in emerging and higher-tech industries
- There is some IT specialization within (and thus differentiation among) colleges

To become an economic force in the global high-tech economy, West Bank/Gaza will have to shore up its weaknesses and fully exploit its strengths in order to reach its full potential.

4.2 Demographics

West Bank/Gaza has a very young and, compared to other Middle Eastern countries, reasonably well-educated population. A very high birth rate and average family size of 7.6 results in a larger proportion of young people than most industrialized and newly industrialized countries. Nearly half of West Bank/Gaza's residents are younger than 15 years of age, and almost three-fourths of the population is between the typical school enrollment ages of 6 and 23. This places (and will continue to place) a heavy burden on the tax base of the region and, ultimately, on the economic development required to create an expanding job base for this growing work force. Basic and secondary enrollments are projected to rise from about 711,000 in 1997 to 1 million in 2005 and to 1.3 million in 2012.[2] Education already consumes a very large share of West Bank/Gaza's national budget – for primary and secondary education along, expenditures are estimated to increase by 30 to 60 percent between 1997 and 2020. Because so much of the future work force has not completed secondary school, it is vital that economic policies and projects give consideration to the preparation of West Bank/Gaza's future work force.

The PA estimated rates of unemployment in 1998 at 21.5 percent, and rates of underemployment 9.3 percent. About one in four West Bank workers is employed in Israel.[3] Female labor force participation is low at only about 11 percent—5.5 percent in the Gaza Strip and 15.2 percent on the West Bank. In 1996, 41 percent of the population was in the labor force—57 percent employed full time, 14 percent half time, and 29 percent unemployed.

4.3 Incumbent Work Force and Technical Skills

About 41 percent of Palestinians over 15 years of age are in the labor force, and 57 percent of those (23 percent of all adults) are employed full-time. Nearly one in seven employed workers is in agriculture, one in six in or mining or manufacturing, one in five in commerce (including hotels and restaurants), one in twenty in transportation, storage, and communications, and about 28 percent in services and other branches. By occupation, professionals, managers, and technicians constitute 18.6 percent of the labor force. The remainder of those working are employed in low-skilled and semi-skilled positions as farmers, machine operators, assemblers, shop workers, etc. Only 60 percent of the work force is employed by others, on a wage basis. Five percent are employers themselves, 23 percent are entrepreneurs, and 12 percent are unpaid family members.[4]

[2] Mazen Hashwe, Education and Training in West Bank/Gaza, International Conference on Employment in West Bank/Gaza, Ramallah, November 11-13, PNA, p. 23.
[3] Center for Private Enterprise Development, Industry Needs Assessment: Software/Information Technology/Data Processing, 1997.
[4] International Conference on Employment in West Bank/Gaza.

There is little useful information about the skills and competencies of the current labor force, or on how much employers or employees invest in on-going training. Although Palestinian basic literacy levels are higher than those in most developing countries, the average years of schooling of the adult population two years ago was only 8.1 (which is still 1.9 years higher than the Middle East average). The dominance of "low technology" industries in the current economy and the young age of the population suggests a shortage of the kinds of technical skills and experience that are typically acquired on the job in economies that are based on more technology-dependent industries. A recent government report noted that "the main challenge facing the Palestinian economy is to create jobs in the skilled and semi-skilled categories."[5] The report's recommended strategy for the region—perhaps because of this lack of skills—targeted seven industries that are traditional in nature and relatively low in technical skill requirements and use of technology (only two of the sectors are moderately technology-intensive).

Even in the higher-technology sectors, worker skill levels are low. For example, in plastics, only one in three workers have completed high school, and only two percent have any university-level training. Yet despite this lack of skills, information technology appears to be a field with growing appeal and therefore a growth area for re-training. There appears to be a percentage of the work force with both the desire and capacity to learn IT skills, as demonstrated by the large number of Al-Quds Open University students enrolled in computer-related classes. PECDAR has estimated that the total Palestinian "IT workforce" numbers at least 1,600 individuals, based on newspaper solicitations for resumes. The Ministry of Labor informally estimates that given demand by employers, the Palestinian labor market could provide about 200 software programmers immediately, and feed in additional programmers through training courses.

4.4 The Educational System and Resources

Article 24 of the Palestinian Basic Law establishes education as compulsory through the basic stage, and as free to every citizen through university. A special committee of the Palestinian

[5] Ministry of Planning and International Cooperation, Building Competitive Advantage in the Palestinian Economy, 1998, p. 38.

Legislative Council studies and discusses related laws and regulation, guarantees access, and responds to complaints and petitions. The enterprise is administered by two agencies of the Palestinian Authority, the Ministry of Education (MOE) and the Ministry of Higher Education (MOHE), which administer the system and approve and supervise the teaching of the curricula.

The Palestinian educational system begins with Kindergarten, followed by ten years of basic education, and then by two years of secondary education (see Tables 4.1 and 4.2). The last two years are offered at general secondary schools, vocational schools, vocational secondary schools, and vocational training centers. The education system is complex in that it includes not only government-administered schools and universities, but also private, non-profit, and United Nations Relief and Works Agency (UNRWA) administered institutions. At the basic and secondary levels:

- 68 percent of students are in government schools,
- 26 percent in UNRWA schools, and
- 6 percent in private schools.

Table 4.1: Enrolments in Compulsory Education, 1998-99

Level	West Bank	Gaza	Total
Kindergarten	52,204	24,969	77,173
Basic	447,369	299,545	746,914
Secondary	38,121	27,687	65,808
Secondary vocational*	(172)	(1,974)	(2,146)
Grand Total	**352,201**	**537,694**	**889,895**

** Vocational students included in secondary totals*
Source: Education Statistics 1999/1998, Palestinian Central Bureau of Statistics, Ministry of Education, 1999.

Table 4.2: Education in West Bank/Gaza, 1998-99

Level	Institutions	Fields of Study	Enrollment	Faculty FT/PT
Kindergartens	754	-	77,173	2,506
Basic education	1,204	-	746,914	21,646*
Secondary schools	487	44	65,808	1,906*
Vocational Education	-	-	2,146	-
Industrial programs	--	-	1,390	-
Vocational training centers	13	-	5,000	-
Technical colleges	16	10	4,599	254/78
Universities	11	18	46,176	1705/278
Adult education centers**	143	-	15,000	600/400

** An additional 3,809 schools teach both basic and secondary education.*
*** 27 government schools, 14 charitable organizations, and 102 private schools*

Basic and Secondary Education

Although the Palestinian population places a high priority on education, the secondary educational systems are quite weak - somewhat better than Middle East averages, but well below standards of most industrialized and emerging economies. A recent government report states bluntly that "improvement of quality of education is a cardinal requirement to improve Palestinian competitive advantage in the context of an export-oriented development strategy"[6] The First Palestinian Curriculum Plan (1998) states that "education is a basic tool for economic development" and that "the curriculum should produce a skilled workforce bearing in mind the priorities of the PNA and its plan to rebuild the economy."

A high proportion of the youth population is enrolled up to grade 7, but dropouts increase dramatically after that point. Dropout rates during secondary education are higher for females than males—but in both cases much lower for those in the science programs (1 percent for males and 3.5 percent for females) than vocational or literary programs. The net enrollment in upper secondary education is less than half of the eligible population (43 percent). This has been attributed in a recent study to

[6]Ministry of Planning and International Cooperation, Building Competitive Advantage in the Palestinian Economy, 1998, p. 39.

- Lack of relevance of the education
- Travel distances to schools
- Economic value of child labor
- Lack of opportunities for children with special needs[7]

Even of those students who did complete secondary education in 1995-96, about 16,000 failed their final examinations and others were not accepted into higher education because of poor academic records.[8]

Beyond enrollments and graduation rates, good information about education in the Palestinian Territories is scarce, making it difficult to compare current levels of attainment or achievement with those in other countries. UNESCO collected some data in 1997, but many measures specific to West Bank/Gaza are missing. Palestinian students' scores on an International Assessment of Educational Progress conducted in 1993 were below scores of most other nations, but the exams may have been depressed by Intifada-related school closings.

Educators and other experts in West Bank/Gaza who were surveyed in 1996 placed much of the blame for poor educational performance (especially the lack of good problem solving and analytical skills) on the low quality of teaching. Common criticisms included poor preparation and skills of teachers, and a reliance on traditional, autocratic, and overly harsh teaching styles. A common educational mission or philosophy is also lacking.[9] Evaluations are also critical of the lack of relevance and creativity of classroom instruction, noting that most teachers still use teacher-focused lecture methods rather than learner-centered methods. As a result, Palestinian students rank relatively low in verbal and mathematical scores, and, perhaps because of these teaching methods, perform worse in the application and synthesis of information.[10] The 1993 International Assessments indicated lower performance on problem solving items than on knowledge acquisition.

[7] World Bank, Draft Comprehensive Development Framework for West bank and Gaza: Education and Training, Basic and Secondary Education, 1999.
[8] Ministry of Education, First Palestinian Curriculum Plan, 1998.
[9] Blair Van Dyke, Consensual Educational Perspectives in Post-Accord West Bank/Gaza, 1996.
[10] World Bank, 1999.

Part of the problem is that education is under-funded and teachers' salaries are low. Teachers in West Bank/Gaza have little formal education: only about 25 percent have bachelors' degrees and only 22 percent are specialized in the sciences. Many have no special training in their field of instruction, and there is little mentoring or in-service training, and no formal feedback system to help teachers to improve their skills. Low teacher salaries make it difficult to attract highly skilled people, average class sizes are large, and shortages of up-to-date texts and modern resources (including libraries and laboratories) are in short supply. Many schools operate in two shifts, and some use rented classrooms that do not meet minimum standards. All of these factors contribute to the low quality of education in West Bank/Gaza.

The curriculum was greatly improved in 1997-98 by a Palestinian curriculum plan that tries to integrate Palestinian culture, religion, interests, and educational needs. However, this curriculum still concentrates on religion and the arts, with few applied science, health, or environmental courses. Despite the Plan's declaration of support for the economy, it includes few subjects aimed at work force development, and the few courses that are included are often not implemented. For example, while the Plan includes two periods for "technology and applied sciences" in grades 5-9, the schools taught none. In the 10th grade, the plan again allots two periods, but these were not taught in Gaza. In 11th grade, the plan also allots two courses while the schools taught none, and in 12th grade, the subject disappears from the plan. In the first secondary academic grade, this means that 57 percent of class time is devoted to literary subjects, 37 percent to math and science, and less than 6 percent to technology and applied science.

Vocational / Technical Education and Training

The vocational/technical system of education begins in secondary schools and continues through tertiary institutions. This system is charged with a broad set of missions that include providing a skilled labor force and qualified technicians, keeping up with scientific and technological progress, increasing labor productivity, and introducing new skills and technologies into the economy.[11] The system is now undergoing a series of reforms to eliminate or reduce fragmentation and lack of coordination among multiple institutions, make it more responsive to market demand and technological changes, increase its resources, encourage higher enrollment among females and students with special needs, and improve its image.

Vocational education is first offered as a choice in the last two years of secondary schooling, which are divided into separate academic and vocational tracks. Currently, only three percent of students choose the vocational industrial, commercial, nursing, or agriculture programs, while 97 percent choose the academic track (66 % enrolled in the arts and 31% in the sciences). Thus, "most students are streamed into universities and end up unemployed on one hand, while properly qualified skilled workers are quite hard to find."[12] Officials attribute the low participation in vocational education to a lack or resources rather than to a lack in demand, although they acknowledge the low perceived status of that track makes it difficult to attract qualified students. They cite Nablus as an exception, where 500 students applied for 150 places in the school, and Hebron, where between 300 and 400 students applied for just 90 openings. The Ministry of Education (MOE) has a goal to increase enrollment to 15 percent of the secondary school population, and to increase qualifications so that graduates can choose to go on to higher education (25% do so now, mainly to technical colleges).

Traditional vocational classifications are based on economic sectors, and most specialties focus on traditional industries and occupations. All information technology is subsumed under "electricity and electronics," but with a focus on production-related

[11] Ministries of Education, Higher Education, and Labor; Implementation Plan: Vocational and Technical Education and Training Strategy.
[12] Palestinian Authority, Reference Paper on the National Palestinian Vocational and Technical Education and Training Strategy, 1998.

skills rather than service sector skills. Schools at Nablus, Ramallah, Tulkarem, Jenin, Jerusalem, and Hebron (females only) have programs in computer maintenance, but none lists programs that teach computer applications.

Secondary students who wish to continue on to higher vocational education in West Bank/Gaza and who pass their Tawjihi examinations are eligible to enroll in one of 16 technical colleges. These colleges concentrate on diploma and associate degree programs, although a few also award bachelors' degrees. The Ministry of Higher Education (MOHE) administers five of the community and technical colleges, the United Nations Relief and Works Agency operates three, and eight are private or non-profit institutions. Budgets are tight, and schools face shortages of modern facilities, technical labs, and equipment. Much of the modern equipment that was observed was the result of recent donations from European governments or donor agencies.

Of the 16 technical colleges, 12 offer programs for some form of IT skills, including computer programming, computer technology, office automation, data base management, multi-media, and industrial automation. These colleges face many of the same problems attracting students as community colleges in U.S. and Europe: Youth with the ability to enter technical programs want university degrees. Two-year degrees are less recognized by employers and society. Those youth who do enter two-year colleges are likely to choose management programs if male, secretarial programs if female. Nonetheless, 680 students were enrolled in computer programs and 566 in engineering programs in 1996-97.[13]

One result of these perceptions is a tendency toward credential inflation, with the technical colleges adding four-year degree programs and competing with universities. The Palestinian Polytechnic Institute now serves 60 percent 4- or 5-year degree students and 40 percent two-year students, a distribution they believe to be appropriate to labor market needs. A Bachelor of Technology program is in the planning stage at Khadoury in electronics maintenance. Plans are underway to establish an additional private technical college in Nablus, funded by private sources and modeled after the German post-secondary model.

[13] Ministries of Education, Higher Education, and Labor, 1999.

The modular system is based on the Scottish Vocational Education Council system (SCOTVEC), under which an individual accumulates individual National Certificate Modules in a personal portfolio until he/she has a sufficiently large cluster to be certified as prepared to enter an occupation. The British Council originally supported the exchange that led to the adoption of the modular concept, but the Ministry rejected the Scottish pass/fail outcomes in favor of grades. The system is being pilot tested in industrial automation programs, and the Ministry's goal is to implement it across all programs by the year 2003.

Universities and Four-Year Colleges

After successfully passing the Tawjihi examinations, high school graduates also can choose from eleven Palestinian universities (three in Gaza and nine on the West Bank), as well as from the 16 community and technical colleges described above. Another, the Arab-American University backed by several Arab countries, is under construction in Jenin. This university plans to have a computer engineering program.

78 percent of university applicants were accepted in the 1996-97 school year. Some students choose to study outside of West Bank/Gaza, and there is considerable interest in attracting them back to apply their skills in the Palestinian economy. The largest universities in the West Bank are Al-Quds and An-Najah Universities. As illustrated in table 4.3, about one in eight university students specialize in the sciences, engineering, or technology, including computer sciences. Table 4.4 shows the distribution of post-secondary students and graduates across disciplines for the West Bank and Gaza compared to other countries for 1995.

Table 4.3: University Students by Fields of Study, 1996-97

Field of Study	Percent Enrollment
Humanities	15.1
Education	24.5
Engineering	6.1
Law	7.6
Economics/commerce	20.6
Medical/nursing/pharmaceutical	3.0
Science/technology/computer	6.5
Other	16.4

Source: Mazen Hashweh, *Education and Training in West Bank/Gaza*, Ramallah: Palesinian Ministry of Labour, May 1988, p. 59.

Table 4.4: Cross-National Comparison of Students (Graduates) by Area of Study, 1995

Location	Education	Humanities	Law & social sciences	Science and engineering	Medical
West Bank	9 (15)	30 (26)	27 (26)	28 (19)	6 (12)
Gaza	28 (20	29 (11)	15 (10)	19 (8)	5 (8)
Jordan	10 (14)	17 (20)	32 (28)	28 (24)	12 (11)
Egypt	17 (24)	18 (17)	40 (32)	15 (15)	8 (10)
Mexico	11 (3)	3 (3)	45 (51)	33 (33)	8 (10)
South Africa	21 (43)	12 (7)	44 (31)	18 (14)	4 (4)

Source: *World Education Report 1998: Teachers and Teaching in a Changing Worl*d, Paris:UNESCO Publishing, 1998

As table 4.5 demonstrates, each Palestinian university has either a computer science department or is planning to develop existing courses into some computer field or program of study. However, West Bank/Gaza produces only about 65 computer engineers per year (although there are additional graduates in other computer fields such as computer information systems). Al-Quds, which established West Bank/Gaza's first computer science program in 1982, turns out 30 graduates per year. About half of the graduates last year started their own businesses following graduation. In recent years, demand for computer courses has skyrocketed, and now, only half of applicants are accepted into the program.

Bethlehem University offers a new minor in computer/IT for all students. The minor is based on completing three compulsory courses and three (out of six) elective courses. In 1998-99, 50 students enrolled—10 from business and all mathematics students. The university is considering making computer sciences a major when a faculty member completes her Ph.D. in. The department head believes that the University's niche may be in banking applications.

Fewer universities have centers of excellence in biotechnology or agricultural research. Bethlehem does offer a good biotechnology program with research projects in genetics and water research. The biotechnology laboratory is funded by UNESCO, and students are engaged in cooperative research with students from other institutions.

Table 4.5: Examples of West Bank Higher Education Resources: Computer Sciences and Information Technologies

Institution	Location	Level	Continuing Education	Relevant Programs	Number	Resources	Industry Connections
Palestinian Technical College	Khadouri	2-Year, some BS planned		Software Telecommunications		4 computer labs	Informal Students spend 2 mo. in industry
West Bank/Gaza Polytechnic	Hebron	2-Yr40% BS -60%	Automation Comp. Systems Cisco cert.	Information systems Computer Engineering Automation Eng.	220 110	Internet provider on site, automation lab, PLCs,	Programs with PalCom, technical assist, feas. studies
An-Najah University	Nablus	BS (5-year)	TQM. ISO Skill upgrading	Electrical Engineer 2-yr computer Strong in Chemistry			
Al Quds University	Ramallah	BS	Oracle Training	S&T faculty Electronics engineer Computer science	1,600 30 grads	PCB lab	Microsoft, Oracle Students work in industry 40-50 hrs
Al-Quds Open University	West Bank/Gaza	All levels			17,000	Limited, but moving to computer based distance learning.	
Birzeit Unioversity	Birzeit	All levels	Computer studies	Electrical engineering Computer science		Computer lab Engineering workshops	Computer Center IT Unit
Bethlehem University	Bethlehem	BS		Minor in computer/IT for Science, business	50		
Al-Arroub College	Hebron	Assoc.		Office automation Finance/banking TV/media	 55 37	Only TV/media lab	Students work 2 mo. in industry over summer
ArabAmerican University	Jenin	K-PhD	Computer Eng. to start	Scheduled to open 2000			
Hebron University	Hebron	BA/BS		Computer science	500		
Kalandia Training Center	Jerusalem (refugee camps)	Voc. Ed, Second., 2 -year		Minimal			

4.5 Systems for Acquiring Labor Market Information and Experience

An apparent weakness in the human resource system is the collection, coordination, and dissemination of labor market information and the institutional fabric that connects the schools, students, and employers. Up-to-date information and good relationships are vital for:

1. Monitoring skills needs in order to ensure that programs and curriculum are relevant to emerging business needs

2. Giving students and faculty familiarity and experience in the work place

3. Helping youth make informed choices among career paths

The Ministry of Higher Education acknowledges the need for programs to be more demand driven and would like more participation in curriculum design. However, the Ministry indicated that it gets little response or input from industry.

Monitoring

The government has no formal system for monitoring demand and assessing the current or projected skill requirements of employers. Neither colleges nor universities have active industry advisory boards or procedures for regularly interacting with industry. Colleges no not rely on industry needs assessments to inform their new curricula design and development, although a small number of colleges and universities periodically conduct their own surveys. Without systematic industry input, it is difficult if not impossible to achieve the demand-driven programs that the Ministry desires. Stronger links between academia and industry, according to one faculty member, are difficult to implement due to a lack of trust.

In the absence of formal systems, selected faculty rely on informal relationships that, they claim, provide them with some knowledge of skill needs. Others gain knowledge through consulting or contractual arrangements. One connection frequently cited was with PalCom. The IT faculty at An-Najah University consults for industry. One faculty member at Al-Quds University is also conducting a survey of environmental awareness among Palestinians. Al-Quds also integrates industry by asking a private sector representative, often from a computer company, to lecture each week.

According to the Ministry's Plan for Education, part of the reason for this lack of a scanning mechanism is the difficulty in forecasting demand. This reasoning is used as an argument for flexibility through modularization of the curriculum so that competencies can be aggregated in various ways to meet skill requirements. But this flexibility is applied to the system (in the form of modularization) rather than the individual, to enable students to adjust quickly to changing skill requirements.

Work Experience

Although workplace education is not part of the structure of the curriculum, most schools do require some short-term summer employment experience. A number of officials commented on the paucity of practical experience among new graduates. Students were strong in fundamentals but weak in applications. A recent assessment of the IT industry found a "critical dearth of practical, not theoretical, IT software and systems training—of end users as well as developers." This situation reflects the teaching objectives at some schools. For example, most computer science students at Hebron University expect to teach, not go into industry. Yet even future teachers ought to know about and introduce practical applications in their instruction.

One effort to change this situation and to establish an apprenticeship-type program with industry is the planned Hijjawi Training Center, which backers expect merge with the two-year college associated with An-Najah University. According to the Chairman of the Nablus Chamber of Commerce, industrial schools have been neglected for 30 years. The Chamber conducted a needs assessment survey of industry and traveled to Germany to see that technical training system. As a result, the Chamber signed an agreement in 1994 with the German Chamber of Commerce to develop polytechnic programs at Nablus according to the German model, in which students alternate between education and work experience, and the Chamber gives the examinations to the completers. Implementation began in 1998-99 - the land is ready, but the project is now delayed as local officials seek additional financial support.

4.6 Training and Continuing Education

Most of the technical colleges and universities offer non-credit continuing education courses in the evenings and on weekends, but few target companies as customers for such courses. For example, Al-Quds University offers community courses in Microsoft and Oracle, and to date 800 have taken the Oracle training (students can get a minor in Oracle). The Palestinian Polytechnic Institute (PPI) teaches major software systems and languages such as UNIX, C++, and NT. A staff member has been certified by Cisco systems. PPI also works with Intel and has a joint program with Paltel.

The demand for these courses generally comes from individuals, not businesses. Many of those interviewed expressed a desire to serve companies as well, but did not because of lack of interest. It is not clear whether the institutions market themselves adequately to the private sector. There are also 143 adult continuing education centers that offer a variety of courses. Last year, half were related to computer skills, but little is known about the quality of or ability to sequence the courses to achieve certain skill levels or how many were even vocationally oriented.

4.7 Social Infrastructure and Cultural Cohesion

Social capital is strong in the tight-knit communities of West Bank/Gaza and there are many informal avenues for knowledge sharing and transfer. This allows for the easy transmission of crafts, manual, and business skills, and provides opportunities for networking. However, information about modern technologies is less universal and not as easily shared. Thus, formal mechanisms are being created in the form of software and high tech industry associations. The core of an organization exists, but more effort is needs to recruit members and to develop an array of real services and benefits to members. Some organization that focuses on the IT industry is an important part of building the sector, and generating the conditions for firms to get external economies of scale that will allow them to operate at lowest costs and highest efficiencies.

4.8 The Educational Pipeline for Information Technologies

Given what is known about the educational infrastructure, the students in the system and the choices they make, and the labor force, what is the potential supply for information technology industries in the short and long term?

The West Bank exhibits more potential than realized strength at the moment. The skills for IT occupational fields reside mostly in the young people and recent graduates, not the incumbent work force. The Palestinian economy is dominated by industries that do not yet rely heavily on information technologies. Although literacy rates are relatively high, the educational process has included very little science and technology, and wide-scale access to computers in schools is quite recent (where it does exist at all). Job skills typically have been acquired informally, which means that unless an employer, family member, or friend uses computer technologies, the employee is unlikely to have any marketable IT skills. Yet the region's potential is exhibited by:

- Rapidly growing programs and enrollments in computer fields in the schools, with many programs oversubscribed and equipment overtaxed, indicating a high level of interest among young people
- Strong interest in improving quality and examining other systems, e.g., adoption of ScotVec standards and modularization for some programs
- Increasing female enrollment in technical programs, particularly in computer fields
- A high level of entrepreneurship among graduates
- Some specialization within and differentiation among colleges—but no apparent rhyme or reason for choices; therefore, also some duplication
- An awareness in the schools of the importance of being demand-driven and linked to industry - even if frustrated by rarely being able to develop those links

This potential, however, is offset by:

- A high birth rate that draws education resources to the earlier school years, where enrollments are increasing the fastest
- A high dropout rate after the primary years
- No formal industry advisory boards with any authority or responsibilities and little industry involvement in planning

(one exception is in Nablus, where the Chamber is seeking to replicate the German model)

- No systematic way of gathering information from industry about IT skill needs

- Lack of modern IT resources and qualified teachers (highly dependent on donations from foreign governments)

- Duplication of effort, especially in continuing education/business and industry programs (customers lack data necessary to make informed choices)

- Lack of coordination and lack of connections to technical schools and education systems in other places that can provide ideas for improvement and innovation

Given these constraints, an estimate of the supply of workers for IT industries over the next two years, based on graduates of institutions of higher education and possible return of educated Palestinians from abroad, is illustrated in Table 4.6:

Table 4.6: Estimated Supply of IT Work Force, 1998

Category	Prepared	With Training[c]
IT professionals (e.g., programmers, systems developers)	375[a]	1,600[d]
IT skilled workers (e.g., web designers, network admin.)	250[b]	60
IT support workers (e.g., keyboarding, call centers)	-	4,600[e]
IT hardware/manufacturing technical	200	-
IT hardware/manufacturing semi-skilled	-	1,300[f]

[a] Based on estimated 150-200 freelance software engineers plus 200 annual expected university graduates.
[b] Based on recent and expected graduates in computer related fields in community colleges.
[c] Assumed preparation in field that is common route into IT with additional training, such as engineering or business administration.
[d] Assumes that one in four graduates and recent graduates of four-year science, technology, engineering, and economics programs has the interest and knowledge to enter IT fields with additional training.
[e] Based on very rough estimate of graduates of commercial and business vocational schools, unemployed Palestinians with good literacy and keyboarding skills plus two percent of existing unemployed and underemployed work force.
[f] Rough estimate assuming that one percent of the existing unemployed labor force can be retrained for semi-skilled positions

5. The Economic Context

5.1 Approach

The previous two chapters described the technology and human resources context through which the KTDC must be understood, and in which the KTDC is to be developed. Both issue areas pose unique challenges and opportunities for designing a successful KTDC at Tulkarem, and our analysis of these issue areas points to a number of issues and implications that will guide our understanding of and approach to the KTDC through the remainder of this study.

In addition to these technology- and human resources-specific issues, the design and development of the KTDC is also strongly influenced by the broader economic and investment environment in West Bank/Gaza. While some of these issues have been addressed in previous studies, broader economic structures and policies also have very specific impacts on the proposed KTDC. For example, investment incentives may not be equally valuable for garment manufacturers and R&D laboratories; trade barriers have different implications for food processors and telemarketers; and tax treatment of a wholly-owned packaging subsidiary may be quite different from that of a three-way software joint venture.

The approach of this chapter is thus not to present a comprehensive review of the Palestinian economy, but to isolate and discuss specific aspects of the Palestinian economic context that are particularly relevant to the kind of activities and investment vehicles we envision for the KTDC. In particular, this chapter addresses:

- Economic performance and structures, and cross-border integration and cooperation
- Investment trends, investment sources, and the role of West Bank/Gaza and Tulkarem as an investment destination
- Labor markets, employment policies, and cross-border skills gaps and labor flows
- Trade agreements, export markets, barriers to trade, and the role of industrial estates as trade platforms

- Investment policies, regulations, incentives, and policy and administrative barriers to investment
- Tax treatment of Palestinian and foreign firms, double taxation, and implications for KTDC development
- Intellectual property protection, existing legislation, and reform needs to support KTDC investment
- Capital markets, sources of financing, and the role of investment guarantees and venture capital
- Existing Palestinian economic development strategies and their compatibility with KTDC development

The chapter then concludes with a discussion of the issues identified, policy recommendations flowing from those issues, and their implication for KTDC demand and development.

5.2 Economic Environment

The "Palestinian economy" is a unique in many respects: Its jurisdictional history (British Mandate, Egypt, Jordan, Israel, PA), geographic division (Gaza vs. West Bank), and administrative complexity (Areas A, B, C, and settlement enclaves) make categorization a difficult task. The Palestinian economy is a national economy without internal autonomy; it is a regional economy without national integration; it is a customs union member without customs cooperation; it is a trading partner without entrepots; it is a monetary union member that circulates two currencies.

While this economy is difficult to define, its problems are very visible: High unemployment, declining GDP per capita, restrictions on the movement of goods and labor, and regulatory and administrative uncertainty in virtually every aspect of economic life are hallmarks of the Palestinian economy. Positioning the KTDC in this context can help to boost employment and address underemployment of skilled personnel, boost GDP growth, and overcome the problems of labor mobility and movement of goods that are usually associated with participation in the Israeli economy. Conversely, regulatory and administrative uncertainty pose constraints that are more pronounced in knowledge-based activities than in traditional manufacturing industries.

Table 5.1: Palestinian Economic Indicators

Indicator	1993	1994	Est. 1995	Est. 1996	Est. 1997	Proj. 1998
Real GDP growth (NIS, 1986 prices)	-1.3%	10.8%	-5.6%	-1.7%	-0.8%	2.2%
Real GDP per capita (NIS, 1986 prices)	1,470	1,567	1,424	1,346	1,261	1,219
Workers in Israel ('000)	83	53	32	22	35	35
Unemployment (percent)	18.0%	24.7%	29.0%	33.4%	31.1%	30.6%
Inflation (CPI)	11.0%	14.0%	10.8%	8.4%	6.0%	6.0%
Trade balance (US$ mil)	-902	-798	-1,327	-1,617	-1,593	n/a
Trade balance w/ Israel (US$ mil)	-812	-716	-1,176	-1,391	-1,251	n/a

Source: IMF, The Economy of the West Bank and Gaza Strip, 1998

The Palestinian economy has stagnated, with a real GDP growth since 1992 of less than 3 percent. Because remittances from abroad have decreased significantly, real GNP has actually declined by 15% over the same period. With a natural population growth rate of 3.9 percent,[1] real per capita GDP continues to decline even in years of modest economic growth. Poor economic performance and a sharp decrease in the number of work permits for Palestinians in Israel have increased the unemployment rate to above 30 percent. In this poor macroeconomic environment, it is unlikely that the KTDC can build on significant internal demand in the already small Palestinian economy.

This poor economic performance is particularly troubling since the regional and world economy has been experiencing a protracted period of growth – world real GDP growth has averaged close to 4 percent in the past five years. In a less favorable international economic context, the position and performance of the Palestinian economy would be even worse.

Addressing West Bank/Gaza's stagnant economic growth through policy and investment initiatives is complicated by the uncertainty

[1] Demographic Survey, 1994.

regarding the PA's autonomy in economic decision-making. In theory, the Paris Economic Agreement[2] spells out the economic relationship between Israel and West Bank/Gaza in terms of monetary, fiscal, and trade relations. However, partial implementation of the Paris Agreement and the passing of the interim period deadline on which the Agreement was based mean that bilateral economic relations remain in flux. In addition to the level of uncertainty this arrangement creates, provisions and implementation of the Paris Agreement has proven to be inadequate in four key areas:[3]

1. The VAT and customs revenue sharing mechanism creates tax leakages into Israel of as much as 5 percent of GDP.

2. Israeli quality standards and export market limitations to Arab countries limit Palestinian trade.

3. Closures have skewed Palestinian production away from high-potential agricultural and manufactured goods.

4. Trade relations with third countries have not been expanded sufficiently to compensate for Israeli NTBs.

While these issues have a negative impact on the Palestinian economy as a whole, their combined effect on the feasibility of the KTDC are quite different from the impact on agricultural or light industrial production. Especially in terms of closures and physical export procedures, the KTDC offers technology entrepreneurs a platform that helps to overcome these constraints in a way that is not possible for producers of perishable agricultural goods or time-sensitive subcontracted production.

Of perhaps greater concern for potential KTDC investors is the unclear legal and regulatory environment within West Bank/Gaza. At present, much of West Bank/Gaza's commercial code remains based on 1967 Jordanian and Egyptian legislation. While the PA has embarked on an ambitious program to draft and implement new commercial laws and regulations that meet the requirements

[2] Formally known as the Protocol on Economic Relations between the Government of Israel and the P.L.O., representing the Palestinian people, 1994.
[3] World Bank/MAS, Development Under Adversity – The Palestinian Economy in Transition, 1999, pp. 86-90.

of a modern economy, much of this work remains in draft form. Especially in areas such as intellectual property and copyrights, investors do not yet enjoy protection and guarantees in line with international standards.[4] Even in areas where laws have been promulgated, the supporting regulatory and administrative framework is often not sufficiently well developed to allow investors to anticipate the application of existing law in a consistent and transparent manner.

In this uncertain investment environment, the PA has shown flexibility in applying existing laws, and investors have been able to make special arrangements for, *inter alia*, circumventing foreign equity restrictions on a case-by-case basis. While this *ad hoc* approach is encouraging, it is insufficient in developing a transparent investment framework. In the case of the KTDC, an opportunity exists to establish KTDC-specific arrangements through PIEFZA and the industrial estate program. Because PIEFZA already concludes memoranda of understanding with other PA ministries in operating its one-stop shop, similar agreements can be concluded in policy areas specific to the KTDC (i.e. telecommunications) at the project's outset and then automatically transferred to KTDC tenants. The KTDC's industrial estate structure thus offers an institutional framework within which existing Palestinian investment policy weaknesses can be preempted.

West Bank/Gaza's recent economic performance and existing economic framework thus pose a number of constraints to technology-based economic development. However, a number of these constraints can be mitigated by creating a geographically focused technology development node (such as the KTDC) under the existing industrial estate program. The remainder of this chapter examines a number of specific issue areas that affect technology-based development, and develops approaches for addressing these issues in the context of the KTDC.

5.3 Investment Trends

Following the 1993 agreements, expectations were high that progress in the peace process could quickly be translated into

[4] The Ministry of Economy and Trade has prepared a draft law that is compliant with WIPO and TRIPS requirements.

increased investment, both in terms of increased domestic investment and through inflows of foreign direct investment. These expectations were not met. Between 1993 and 1997, real private investment in the Palestinian economy actually dropped by an average of 10 percent per year, and declined from 19 percent of GDP in 1993 to 10 percent of GDP in 1997.[5]

Private investment in West Bank/Gaza has historically been heavily skewed towards residential real estate, which today still accounts for over 80 percent of total private investment. This kind of investment has often been seen as a store of value (especially in the absence of a well-developed banking system) and, in the absence of significant investment in machinery and equipment, suggests that real estate investment has been largely driven by economic growth without contributing as a potential source of growth.[6] A short construction boom after 1993 drove up land prices and added significantly to the high-end housing stock in urban centers, but this investment activity tapered off by 1996[7] and did not suffice to stave off the overall decline in private investment levels.

Foreign investment in West Bank/Gaza has also remained at disappointingly low levels. The main sources of foreign investment include diversified holding companies (including PADICO and SIIC) and small investments by Palestinian diaspora businessmen. [8] In addition, some foreign investment is flowing into infrastructure projects, including Enron's participation in the Gaza combined-cycle power plant. Investment in the Gaza Industrial Estate remains primarily local in nature, though some Israeli joint venture investments are taking place in the textile industry. As is discussed in more detail in chapter 8, Israeli-Palestinian joint ventures in the IT sector are focused primarily on training activities for small groups of software engineers.

The main reasons for West Bank/Gaza's disappointing investment performance include 1) political uncertainty and 2) an unclear investment environment. Politically, the uneven progress in the

---

[5] Oussama Kanaan, Private Investment Under Uncertainty in the West Bank and Gaza Strip, in The Economy of the West Bank and Gaza Strip, IMF, 1998, p. 18.
[6] Kanaan, p. 15.
[7] Osama Hamed, Private Investment, in Development Under Adversity – The Palestinian Economy in Transition, World Bank/MAS, 1999, p. 73.
[8] UNCTAD, Private Investment in the Palestinian Territory, 1996, pp. 44-46.

peace process has not only cast doubt on the long-term success of that process, but has also had an immediate negative impact through repeated border closures. Because closures most directly affect the kinds of activities that stand to benefit most immediately from increased economic integration between West Bank/Gaza and Israel (i.e. time-sensitive subcontracting and perishable agricultural goods), the pattern of border closures has been a strong disincentive to increased investment in many of the near-term opportunities that should have been created through the peace process. On a more general level, to an investor, repeated closures lower the net present value of an investment through a combination of impacts on both the average level of demand and production costs, and on the variability in demand and costs, especially in export-oriented industries.[9]

In addition to these external impediments, West Bank/Gaza's internal investment environment is still being developed. As was pointed out above, much of the modern commercial legislation required to build investor confidence in economic structures remains in draft form. Procedures that have been established sometimes retain broad scope for administrative interpretation. While a degree of legal and jurisdictional uncertainty is unavoidable in transitional economies, they nonetheless represent a real barrier to investment.

Both these external and internal barriers to investment are widely recognized, and PIEFZA has done considerable work in addressing these issues under the framework of the industrial estates program. Through its relationship with different ministries and through the introduction of the one-stop shop, PIEFZA is able to clarify the investor's and the PA's responsibilities in the context of specific industrial estates. This site-specific approach can also serve as a focal point for discussions between the PA and the Israeli government for cross-border cooperation specific to individual industrial estates.

In the case of the KTDC, many of the lessons learned in developing the GIE can be applied. In addition, the KTDC's mission opens up several new opportunities for addressing investment constraints that currently limit technology-based investment in West Bank/Gaza. In terms of external constraints,

[9] Kanaan, p. 19,

the KTDC can incorporate many of the “closure-proofing” features that have already been discussed in the context of other industrial estates. While the focus on movement of goods is less pronounced for a technology-intensive KTDC, movement of people – both workers and managers – increases in importance. An agreement on liberalized travel for KTDC workers to training activities in Israel is an especially desirable feature of such a system. In terms of addressing internal constraints, the one-stop shop approach remains vital to the KTDC because many of the software and training investments will be relatively small in nature.

Table 5.2: Potential KTDC Investment Facilitation Framework

	Issue	Potential Approach
External	Closures	• Special negotiated agreements on movement of goods across Green Line into/out of KTDC • Relaxed access for personnel during closures, especially supervisory/management functions
	Access	• Expedited processing of authorized KTDC management and workers • Facilitation of employee training-related travel into Israel (especially for parent-subsidiary training activities)
	Security	• Single KTDC security framework • Central interface for security checks and permits • Streamlined movement of import/export goods
Internal	Jurisdiction	• PIEFZA functions as main IE/FZ oversight body • PIEFZA acts on behalf of other PA ministries • Coordination with PA customs and security functions
	Regulatory Oversight	• MOUs with related agencies and ministries resolve regulatory overlap • One-stop shop centralizes all approval and permitting functions
	Zoning, Land, and Services	• Zoning and subdivision plan approved for entire KTDC development • Plots and leased facilities already available with utility connections • KTDC-wide agreement on liberalized telecommunications access

These investors will have very few resources to devote to navigating a complex bureaucracy. In addition, a KTDC-wide agreement on liberalized access to high-speed telecommunications infrastructure would allow many small investors to have modern telecommunications access at lower costs. Table 5.2 summarizes how both general industrial estate policies and KTDC-specific policies can be applied to address external and internal investment constraints.

5.4 Labor, Employment, and Mobility

One of the main objectives of the KTDC is to create technology-based employment opportunities for qualified Palestinians. With unemployment above 30 percent, job creation remains a major objective. At the same time, it must be recognized that technology industries are not necessarily major generators of employment, and that especially in high-skill areas (such as software development and testing), the KTDC will not have a significant impact on over-all unemployment statistics. On the other hand, lower-skill technology-related manufacturing activity in the KTDC may have a greater impact in terms of employment, especially on the regional economy. The over-all KTDC project will thus balance employment creation benefits with technology transfer and export earnings impacts that will help to broaden and deepen the Palestinian economy.

Technology-based employment also has different short- and long-term impacts. In the knowledge economy of the 21st century, R&D and new firm creation will increasingly drive the creation of entirely new employment sectors. The logic behind the KDTC is thus two-fold: To generate employment in existing technology sectors in the short term, and to develop new technologies that can grow into major employment sectors in the future.

One of the main features of the Palestinian employment base that is relevant to the KTDC is the restrictive management of cross-border labor flows by the Israeli authorities. During the Intifada, Israel embarked on a deliberate policy to limit the participation of Palestinian workers from Gaza and the West Bank in the Israeli economy and, under pressure from Israeli employers, substituted foreign workers immigrants from Asia and Eastern Europe in many of the jobs previously held by Palestinians. Official Palestinian workers from the West Bank and Gaza in Israel now number about 42,000, down from over 100,000 before the Intifada In addition, many Palestinian workers still cross into Israel illegally.

These workers are primarily unskilled and semi-skilled workers in the agricultural and construction sectors.[10] Most are Gaza residents, with about 18,000 West Bank residents receiving official permits.[11] In the Tulkarem area alone, about 1,700 workers receive official Israeli work permits. The permit system is designed primarily to give Israeli employers access to unskilled Palestinian labor on a temporary basis that can be quickly reversed during times of political tension. Securing long-term permits for Palestinian professional to work in Israel remains problematic, and existing IT joint ventures find it difficult to obtain permission for Palestinian trainees to travel to their Israeli parent company, even for short-term on-site training activities.

From the perspective of Israeli IT professionals, working in West Bank/Gaza is associated with serious security concerns. It is commonly perceived that driving into Ramallah with a private yellow-plated vehicle is a dangerous undertaking. The issue of labor mobility on both sides of the Green Line is thus central in any effort to integrate the Israeli IT industry with the Palestinian economy. The design of a successful KTDC must thus address both aspects in order to foster effective joint ventures and other partnerships.

Palestinian Labor: The location of a TDC on the Green Line is a direct result of the existing restriction on the movement of Palestinian workers. The rationale for an industrial estate “haven” in which Palestinians and Israelis can work together is valid only in the context of the political environment that separates Israel and West Bank/Gaza. In this respect, the KTDC obviates the need for Palestinians to travel into Israel to work in the existing Tel Aviv-Haifa high-technology corridor.

Under these circumstances, why do cross-border labor movements matter? The answer lies in the Palestinian skills gap, and in the communications needs of technology workers. While the KTDC includes a significant training component (with both

[10] Abdel Fattah Abu Shukour, Palestinian Labour in Israel, International Conference on Employment in West Bank/Gaza, 1998, p. 79.
[11] Average numbers from January 1998 and February 1999.

public and private financing components), much of the HRD requirements of technology-based companies transcends “hard skills” such as C++ programming or database design. To share corporate culture, absorb company-specific systems and approaches, observe productive and collaborative work processes, and gain exposure to proprietary technologies in a secure setting, it is often still vital for new Palestinian employees to spend at least some time being trained on-site, at the Israeli parent company’s offices. While telephone, email, and teleconferencing can help to bridge this gap, communications technology is still too limited to serve as a real substitute for every-day office dynamics in building relationships and sharing knowledge – both formally and informally. In addition, the international nature of the IT industry requires that Palestinian investors, partners, and professionals be able to attend business meetings and meet international investors on short notice, on both sides of the Green Line.

Israeli Labor: The location of the TDC on the Green Line is also supposed to facilitate access by Israeli labor – especially managerial and senior technical staff – to a safe platform for Israeli-Palestinian cooperation without having to travel through areas that are considered unsafe by Israelis. Israelis can already move across the Green Line without excessive formality, so that commuting arrangements by Israelis living in Israel and working at the KTDC (on either a part-time or full-time basis) would be easy to arrange. Tulkarem is already considered a relatively quiet and safe area that lacks the political tension of locations such as Ramallah or Nablus. This reputation will have to be augmented with some security presence at the KTDC, through a combination of physical facilities (i.e. fencing) and a limited security personnel presence (either PA personnel or private security guards) to monitor access. In the near term, the existing DCO facility will further bolster the security image of the KTDC.

In terms of basic labor policies – wages, employment conditions, collective bargaining, termination and severance – West Bank/Gaza does not impose conditions that are significantly more onerous than those found in Israel. To date, there is no minimum wage in effect in West Bank/Gaza, though the KTDC is unlikely to be affected even if minimum wage legislation is imposed because of the relatively higher wages in the trained labor pool that is most relevant to the KTDC. Of greater importance is the wage differential between Palestinian and Israeli entry-level software programmers described in chapter 7.

5.5 Trade Issues

The future of West Bank/Gaza's trade access and the trade relationship with Israel is one of the central economic questions regarding the shape of the Palestinian economy after the final status negotiations. At present, West Bank/Gaza remains in a customs union with Israel, though the Paris Agreement gives the PA limited powers to increase (but not decrease) import tariffs. On paper, the PA is empowered to modify the customs union with Israel on limited quantities of goods imported from Arab countries, basic foodstuffs, and some tools of equipment (the Agreement's A1, A2, and B list items), but the PA has only marginally implemented this aspect of the Paris Agreement.[12] For the bulk of West Bank/Gaza's international trade, tariffs and NTBs are the same across the customs union territory.

A key issue to be resolved during the final status negotiations is whether West Bank/Gaza should remain in the customs union, or whether West Bank/Gaza should establish an independent customs territory that may or may not be part of a Palestinian-Israeli free trade area. Whatever the outcome of those negotiations may be, it appears to be generally recognized that the small Palestinian economy has the most to gain from an open and liberal trade regime, including liberal and open trade with Israel – whether in the form of a customs union, a free trade area, or an independent trade regime.

West Bank/Gaza already benefits from liberal market access to its main trading partners. The most important market access agreements are summarized in table 5.3 below.

[12] Nur Calika, The Trade System, in The Economy of the West Bank and Gaza Strip, IMF, 1998, p. 52.

Table 5.3: West Bank/Gaza's Market Access Agreements

Partner	Agreements
Israel	**Customs Union Member** No trade barriers, full access to Israeli market
Europe	**EU Association Agreement (Euro-Med partnership)** Duty-free access for industrial products, quota access for agricultural goods; EU-Palestinian free trade area planned for 2001 **EFTA Declaration of Economic Cooperation** Duty-free access for industrial products; EFTA-Palestinian free trade area planned
United States	**Duty-Free Access Agreement** Duty-free access for all products
Jordan	**Protocol Trade Agreement** Duty-free access for 60 products
Egypt	**Technical and Economic Cooperation Accord** Preferential access for some goods
Saudi Arabia	**Free Trade Agreement** Duty-free access for all products

It is interesting to note that several of these agreements represent extensions of existing free trade agreements that West Bank/Gaza's trading partners have already established with Israel. Some agreements extend duty-free access to West Bank/Gaza as an extension of agreements with Israel, while others have been negotiated exclusively with the PA. The agreement with the United States is even more complex in that the U.S. executive branch negotiated the agreement with the PA, but the U.S. Congress only recognizes it as part of the U.S.-Israel free trade agreement.

Regardless of the legal structure of these agreements, it is apparent that producers in the KTDC will have duty-free access to the vital Israeli, European, and U.S. markets. Given the political will on the part of the international community to support West Bank/Gaza, it is highly likely that access to Europe and the U.S. will continue under whatever trade regime West Bank/Gaza finally adopts. On the other hand, trade barriers in the IT industry are losing their importance internationally. The WTO Information Technology Agreement,[13] to which Israel is a signatory, eliminates all duties on listed IT products by January 1, 1999. While this agreement has some developing country exceptions and does not cover all IT products, it is indicative of the general trend to liberalize trade in the dynamic IT industry.

A much more important trade issue than tariffs and market access for the KTDC is the pervasive system of NTBs that impact West Bank/Gaza, especially the history of periodic internal and external closures that have been imposed on West Bank/Gaza. It has been estimates that in 1996, the cost of Israel's policy of closures resulted in a loss of 7.2 percent of GDP in the West Bank and 7.6 percent in the Gaza Strip. When an estimate of the cost of Israel's restrictive permit policies is added to this calculation, these estimates increase to 18.2 percent and 39.6 percent, respectively.[14] While the incidence of closures has decreased since 1996, their impact on the Palestinian economy persists through a number of mechanisms, including decreased production, increased risk factors and lower NPVs for new investments, and a shift of investment towards activities less affected by closures.

The impact of closures on the KTDC are mixed. The presence of closures certainly adds to the risks associated with a KTDC investment, and any manufactured exports would be affected by a border closure. In addition, the interaction of Israeli and Palestinian colleagues would be hampered. On the other hand, software and telecommunications services would be less affected by border closures. It should be remembered, however, that the pattern of closures also includes internal closures, which restrict labor mobility within West Bank/Gaza. Since the KTDC will have to draw at least to some extent on commuting labor, an internal closure would also have a detrimental effect on software and telecommunications services providers who do not physically transfer goods across borders.

---

[13] The Ministerial Declaration on Trade in Information Technology Products entered into force 1 July 1997.
[14] Radwan Shaban, The Harsh Reality of Closure, The Palestinian Economy in Transition, World Bank/MAS, 1999, p. 52.

In addition to closures, other NTBs impede Palestinian export activities and constrain access to imported materials. A recent study concluded that West Bank companies exporting through the port of Haifa face higher costs (18 percent) and longer delays (20 percent) than comparable Israeli companies. Similarly, West Bank importers incur higher costs (11 percent) and experience much longer delays (52 percent) than Israeli companies. West Bank exporters moving airfreight goods through Ben Gurion airport experience even higher costs (39 percent) and delays (78 percent). These costs and delays increase even more if one takes into account required security checks, surcharges by Israeli clearing agents, goods damaged in the transfer and security check process, and the impact of closures.[15]

The impact of these NTBs on the KTDC will be primarily in pilot manufacturing, assembly, and hardware repair/maintenance activities that may locate at Tulkarem, as well as any packaged software production or data entry activities that require physical transfer of goods across the Green Line. Unlike in the case of closures, the KTDC framework itself offers few opportunities to address NTBs that affect KTDC tenants. These issues require broader agreement on Palestinian-Israeli trade, unless specific security arrangements for the transfer of KTDC products can be arranged.

As part of the Palestinian industrial estate program, the KTDC has limited options for addressing constraints in West Bank/Gaza's trade regime. The KTDC is certainly subject to favorable export market access mechanisms, and offers some opportunities to "closure-proof" the KTDC, or at least mitigate against some of the effects of closures. However, addressing NTBs imposed by Israeli security and bureaucratic requirements on an estate-specific basis is more difficult to achieve.

5.6 Investment Policies

The Palestinian investment policies that impact the KTDC are the investment law[16] and the PIEFZA law.[17] The investment law

[15] Federation of Palestinian Chambers of Commerce, Industry, and Agriculture, The Transaction Costs Study: An Examination of the Costs of International Trade in the West Bank, 1998.
[16] Law No. 1 for 1998, Law on the Encouragement of Investment in West Bank/Gaza.

applies incentives to most economic activities, but requires special cabinet approval for a number of sectors, including telecommunications. The law also sets out legal guarantees regarding nationalization, expropriation, financial transfers, and dispute settlement. Under the investment law, core investment incentives include:

- Duty exemption of fixed assets and some spare parts
- 5-year tax holiday, with possible 5, 7, 8, or 10 year extension, based on economic and export performance
- 10 percent income tax rate for 8 to 20 years following the tax holiday period, depending on investment size
- Possible expansion of incentives for Palestinian investors

In addition to these incentives, the PIEFZA law and its regulations provide special incentives for industrial estates and free zones:

- Extension of tax holidays to between 7 and 10 years
- Exemption of estate or zone developers from foreign ownership restrictions
- 20 percent local sales of free zone products at reduced tariff rates in some cases (pending introduction of free zone regime)

The main investment incentives thus consist of duty-free importation of capital goods and a (somewhat complex) system of tax holidays and reduced tax rates. Extension of tax holidays beyond 5 years is generally subject to specific performance requirements and additional approvals.

In the past, restriction on the development of Israeli-Palestinian technology joint ventures included a 49 percent foreign ownership restriction on investments. This restriction did not apply to industrial estate or free zone developers, and could be waived on a case-by-case basis. In practice, this restriction was waived for most serious investors, though the political process for securing such exemptions could be lengthy. In the case of the KTDC, the

[17] Law No. 10 for 1998, Industrial Estates and Free Zones Law.

relatively small nature of many of the envisioned software development investments would have made this case-by-case exemption more difficult. The restriction represented a real hurdle for potential investors (including the Siemens joint venture) because many foreign partners contribute proprietary technology and processes to their investments, and those foreign partners expect to control such ventures through ownership participation above 50 percent. This foreign investment restriction has since been eliminated, a positive development that gives investors greater freedom in structuring their joint venture agreements.

5.7 Taxation

The new Palestinian income tax law imposes a flat corporate income tax rate of 20 percent,[18] and a graduated personal income tax imposed in four bands – 5, 10, 15, and 20 percent. While a tax exemption for R&D activities has been discussed on several occasions, such a provision is not included in the current tax law.

While the Palestinian tax system has been unified internally, it still requires international coordination if it is to effectively facilitate foreign investment. The Ministry of Finance is currently in the process of negotiating a double taxation agreement that includes a tax sparing provision with the United States, and hopes to negotiate a similar agreement with the European Union. The Ministry hopes to complete both within one year.

The Ministry of Finance is also actively working to clarify the tax relationship with Israel and Israeli investors. While the Paris Agreement calls for the development of procedures to address double taxation,[19] this has not been accomplished to date. Under the agreement, both sides have the right to impose direct taxes on 1) economic activities within their respective areas, and 2) residents of their respective areas, even when those residents conduct economic activity on the other side. At present, taxes paid in West Bank/Gaza are credited against tax liabilities arising in Israel. The Ministry of Finance is actively pursuing a tax sparing agreement with Israel, but this may take longer to negotiate than the agreement being negotiated with the Unites States.

[18] The unified 20 percent rate replaces the 38.5 percent previously imposed in the West Bank and the 35.7 percent imposed in the Gaza Strip.
[19] Article V, paragraph 5.

While the lack of double taxation agreements and tax sparing provisions eliminates the tax holiday incentives granted to foreign investors in the investment and PIEFZA laws, those holidays are of limited duration, especially for the types of smaller investments that are most likely to locate in the KTDC. When coupled with the already low corporate income tax rate applied in West Bank/Gaza, the actual potential tax sparing benefit that could accrue to a foreign (and especially an Israeli) investor are not very large. While all additional business costs are significant on the margin, the lack of double taxation/tax sparing agreements does not represent a major disadvantage for the KTDC. Ongoing negotiations should nonetheless be pursued vigorously.

5.8 Intellectual Property

The regime currently in force for the protection of intellectual property rights in West Bank/Gaza dates back to the Mandate period. In the Gaza Strip, virtually no changes have been made to Mandate-era legislation. In the West Bank, subsequent Jordanian legislation consists primarily of an Arabic translation of the same legal framework, with some administrative amendments subsequently introduced by Israeli military orders. In the case of cultural and artistic works, intellectual property protection remains based on Ottoman-ear laws.[20]

While the courts have tended to interpret this legal basis very broadly in order to offer some measure of protection to modern products and processes, the existing system is nonetheless antiquated in many respects and requires significant upgrading, especially if it is to meet the requirements of the kinds of technology- and information-based activities that are envisioned for the KTDC.

Most problematic is the treatment of patents and industrial designs under existing law. Under the current framework, patent protection offers only a negative right to the patent holder to prevent others from exploiting a patent, not a positive right for the holder to exploit the patent – in fact, it does not even ensure that the patent

[20] Perla, Deborah; Abdul Hamid, Ra'ed; Haller, Mordechai; and Kalman, Daniel, Intellectual Property Reform in the Palestinian Territories, IPCRI Law and Development Program Commercial Law Report Series No. 4, 1997, pp. 4-6.

holder is not in conflict with another existing patent. In addition, a number of issues regarding administrative discretion in granting patents, jurisdictional issues, and treatment of inadvertent patent infringements need to be addressed.

The legislative basis for copyright and trademark protection is much stronger then patent protection in terms of applicability and internal consistency. However, existing copyright protection is major definitional shortcomings in terms of addressing new media and technologies.[21] The kind of copyright protection required in the early part of this century was based on physically discrete, visually represented forms of "original literary dramatic musical and artistic works"[22] and does not adequately cover issues related to various forms of digitized media, media carriers, adaptive programs, databases, information content, or other modern inventions that lie at the heart of the innovative process in technology-intensive industries.

The Israeli-Palestinian interim agreement acknowledged the need to improve and harmonize the existing intellectual property protection framework, and specified that the specific framework implemented by both parties should be in full compliance with the Agreement on Trade Related Aspects of Intellectual Property Rights (TRIPS). Because the PA lacks a fully independent foreign policy and is thus not able to joint international conventions, this TRIPS-compliance component in the interim agreement is the only explicit obligation West Bank/Gaza has to conform to international intellectual property standards.[23] The PA is free, however, to enact legislation that conforms to the requirements of international treaty standards.

The PA has already undertaken a process of passing new intellectual property protection legislation, and the Ministry of Economy and Trade has prepared a draft patents, designs, and trademark law that it believes conforms to TRIPS World Intellectual Property Organization (WIPO) standards. Copyright protection falls under the ambit of the Ministry of Culture, which is also beginning to re-examine copyright protection currently in force in West Bank/Gaza. Even under existing law, the

---

[21] Perla et. al, p. 20.
[22] British Copyright Act, 1911, Article 1.
[23] Perla et. al., p. 31.

enforcement mechanism for intellectual property protection is not well developed. The PA is sensitive to criticism that violation of intellectual property rights and points to individual enforcement actions (such as the recent shutting down of a CD pirating operation in Hebron). However, these reactive approaches, based on high-level international pressure, are not an adequate substitute for a robust and transparent enforcement mechanism that is accessible to all holders of intellectual property rights.

The introduction of a modern, TRIPS- and WIPO-compliant intellectual property protection regime is an absolutely necessity for the development of the KTDC. Especially in research-intensive activities and new product and software development, investors must be reassured that their innovations will become their proprietary assets. Even in more basic activities such as software testing and conversion, investors must be given the confidence that intellectual property that is transferred to a subsidiary (rather than developed by the subsidiary) will not leak into a gray legal area where it is threatened with piracy.

This need for intellectual property protection extends beyond copying of protected materials or industrial espionage. Especially in the software field, such protection is required to assure employers that employees who leave a company cannot exploit intellectual property that they may have themselves developed on the job. Failure to address this critical gap in the legal framework will severely limit the types of investment that will be attracted to the KTDC to basic data entry, call center, and low-tech assembly operations. Even some of these investments, such as data entry and processing operations, will be jeopardized if they are unable to effectively claim and protect their ownership to information that is generated at the KTDC.

Passage of appropriate, modern intellectual property legislation is a necessary but not sufficient condition for attracting technology-based industries to the KTDC. Just as important is a credible and transparent enforcement mechanism that allows owners of intellectual property to defend those property rights when they are infringed upon. In order to develop the KTDC quickly, a government policy statement regarding its intent to place a special emphasis on enforcing intellectual property legislation as it relates to KTDC enterprises would help to build confidence in the system. Through a special KTDC consultative process with private industry, KTDC tenants could be brought into a dialogue that quickly determines any gaps and shortcomings in the enforcement process, and suggests approaches and solutions that can then be transferred to West Bank/Gaza in general. Such an approach would again maximize the KTDC's potential demonstration effect and "test bed" function to spearhead national reforms.

5.9 Capital Markets

Since 1993, the Palestinian banking system has grown rapidly, albeit from a very low base. In 1993, West Bank/Gaza hosted 13 bank branches. By the beginning of 1998, that number increased to 89. As of December 1998, the Palestinian banking system attracted US$ 2.4 billion in deposits, up from US$ 219 million in 1993.

While deposits have grown substantially, the volume of Palestinian bank lending remains comparatively low. While the Loan/deposit ratio for the banking sector has been increasing, it reached only 32 percent by 1998. Over half of this loan volume consists of short-term overdraft facilities.[24] With such limited loan volumes and conservative lending approaches, the local banking system will remain a limited of funding for the KTDC and its tenants.

The small Nablus stock exchange represents some opportunities for financing the KTDC. As of July 1999, 19 companies with a total market capitalization of US$ 816 million were listed on the exchange. This market capitalization is dominated by financial services (12 percent), tourism & other services (55 percent) and general investment companies (29 percent).[25] Some of West Bank/Gaza's largest companies, including PADICO and PALTEL, have used the stock exchange to issue partial floats. While the stock exchange does not trade any companies active in KTDC-related industries, it does list a number of real estate development firms, including West Bank/Gaza Real Estate Investment, Arab Real Estate, Arab Hotels, and several investment & development companies. The Nablus stock exchange could thus serve as a venue for at least partial equity financing of the KTDC's private sector development component.

[24] West Bank/Gaza Monetary Authority statsistics.
[25] West Bank/Gaza Security Exchange statistics.

Private sector investment in West Bank/Gaza continues to be dominated by diversified investment holding companies, led by PADICO. These holding companies are large and diversified enough to take on attract significant debt financing. PADICO's involvement in the development of the GIE through PIEDCO is a concrete example of how these holding companies can participate in development of the new industrial estate program. In the case of the KTDC, however, these holding companies lack the expertise required in developing and marketing a technology-based development. While a significant role remains for holding company investment in the KTDC, effective implementation will require a strong partnership with an experienced science park developer and/or operator.

A real opportunity for at least partially funding KTDC tenants (and possibly the KTDC itself) exists in the thriving Israeli IT venture capital industry. By the beginning of 1998, the industry's 81 funds raised over US$ 2 billion, of which 57% was invested, primarily in software, telecommunications, and computers and electronics. As the industry has matured, funds are increasing in size, and links with U.S. and European venture capital funds are becoming more common. Some of the major funds (i.e. Star, Polaris, and Gemini) manage between US$ 150-250 million in capital.

While these VC funds have not yet been major investors in West Bank/Gaza, their focus on the Israeli IT sector suggests that VC funding may well be available for Israeli IT companies looking to move into West Bank/Gaza. The Peace Technology Fund, with US$ 60 million in capital, is pursuing investment opportunities in West Bank/Gaza, and has already invested in PALTEL. If the KTDC is able to generate real entrepreneurial interest at Tulkarem, Israeli VC should be able to serve as a significant source of start-up financing for KTDC tenants.

5.10 Development Strategies

While the KTDC represents a new departure in the PA's attempt to stimulate and diversify the economy, it also overlaps in several important areas with ongoing development strategies. First and foremost, the KTDC must be understood in the overall context of the Palestinian industrial estate and free zones program. Within this context, the KTDC is a strategic opportunity to broaden the existing basic light industrial activities under way at the GIE into a more ambitious technology-driven development that offers new opportunities for value-added services to be provided to investors in the context of an industrial estate. As such, the KTDC calls for new approaches to industrial estate marketing and development, and confront PIEFZA with an opportunity to oversee a more complex owner/developer/tenant relationship involving a more diverse range of corporate entities, operating agreements, and cross-border linkages than has been the case at the GIE.

The KTDC will also have a strong interrelationship with the nascent Palestinian information technology development strategy that is currently being developed with assistance from the World Bank. That effort's attempt to develop a coherent and coordinated approach towards information technology in the areas of education, training, infrastructure, and investment overlaps significantly with the KTDC's attempt to develop a concrete IT-driven growth node at Tulkarem. As the IT strategy is developed, potential complementarities with the KTDC should be exploited to avoid duplication and to utilize the KTDC as a "test bed" for new, private-sector driven initiatives.

At the level of the PA, the KTDC also overlaps with ongoing efforts in human resources development, infrastructure upgrading, and trade and investment promotion. Again, close coordination between the KTDC and broader policy initiatives is required to ensure that accelerated policy reforms and liberalized development approaches implemented under the KTDC framework serve as a demonstration effect that can inform the broader economic development planning process.

While the KTDC is based on a strong private sector-based development strategy, the initiative will require a concerted public sector effort in terms of training, marketing, and infrastructure provision. This public/private sector development mix is outlined in chapters 11 and 12 below.

5.11 Issues & Implications

The issues outlined above shape the economic context in which the KTDC is to be developed. In order to design an appropriate KTDC framework and development strategy, these issues should be addressed, either in the context of the KTDC itself or, in several cases, as part of broader Israel-PA negotiations. Table 5.4 summarizes these constraints and recommendations.

Table 5.4: Summary of Economic Constraints and Recommendations

Issue Area	Constraints	KTDC Relevance	Recommendations
Labor	• Access	• Movement of labor: internal and external	• Relaxed access for supervisory personnel during closures • Expedited processing of KTDC management and workers • Facilitation of training-related travel
Trade	• Closures • NTBs	• Movement of goods • Import/export costs	• Special negotiated agreements on movement of goods across Green Line ("closure-proofing") • Negotiate economy-wide liberalization of security and transportation agreements
Investment	• Jurisdiction & oversight • Zoning, land & services • Security	• Competing ministries • Serviced land provision • Perimeter & border security	• PIEFZA functions as main oversight body, on behalf of other PA ministries • Coordinates with PA customs and security functions • MOUs with related agencies resolve overlap • One-stop shop centralizes approvals & permits • Zoning & subdivision approved for entire KTDC • Serviced plots available w/in KTDC • KTDC-wide agreement on liberalized telecommunications access • Single KTDC security framework • Central interface for security checks and permits
Taxation	• Double taxation • R&D incentives	• Impact on JVs • Diversify investment base	• Conclude negotiations with Israel, U.S., and Europe • Implement targeted R&D incentives to achieve discrete goals (i.e. integration with university system)
Intellectual Property	• Legislation • Regulation and implementation	• Basis for protection • Method of protection	• Accelerate implementation of ongoing reform efforts, in line with TRIPS and WIPO standards • Implement enforcement mechanism in consultation with KTDC tenants
Finance	• Development expertise • VC funding	• Foreign partner • JV funding	• Involve experienced science park developer/ operator in KTDC project • Build on existing links with Israeli JV industry to fund JVs and Palestinian projects

6. Existing Conditions at Khadoury, Tulkarem

6.1 Introduction

This chapter describes the existing physical conditions at the Khadoury site in Tulkarem. Wherever appropriate drawings are used to illustrate the description.

The information contained in this chapter was provided by TSG's local engineering and construction consultant, 1st Option, and is divided into five sections:

1. Site Location relative to West Bank/Gaza and the Region
2. Existing Infrastructure
3. Cultural Resources
4. Site Ownership and land use
5. Issues for the physical planning of the KTDC

6.2 Site Location

The location of the site is within the existing campus of the Palestinian Technical College at Tulkarem and the Khadoury satellite campus of the An-Najah University Department of Agriculture. It is about 400m to the west of the city of Tulkarem. The PA has allocated a 20 ha portion of the campus for the purposes of developing the KTDC. The proposed KTDC site boundaries (enclosing approximately 20 ha) have been identified in Figure 6.13 below.

The site is very favorably located relative to international borders, existing population centers, ports and border crossings, and existing industrial parks in the region as illustrated in Table 6.1 below and Figures 6.1 to 6.7. The city of Tulkarem is 17km from the Mediterranean Sea, and is the closest West Bank Palestinian city to the coast.

Table 6.1: Travel Times in minutes by Road between Tulkarem and various regional features

International Borders		Major Cities ISRAEL		Major Cities WEST BANK/GAZA		Ports, Airports, land crossings		Existing Industrial Parks	
Lebanon	120	Natanya	5	Gaza	150	Haifa Port	70	Tel-Hai	120
Syria	120	Tel Aviv	90	Jericho	110	Ashdod Port	120	Tefen	90
Jordan	120	Ashdod	120	Nablus	30	Tel-Aviv Airport	60	Haifa	70
Egypt	180	Haifa	60	Jerusalem	70	Jerusalem Airport	70	Natanya	15
Israel	5	Nazareth	50	Ramallah	60	Gaza Airport	180	Tel-Aviv	60
						Jordanian Border	120	Ashdod	120
								Omer	180

Table 6.2 Main West Bank Urban Populations

Governorate	Urban Population[1]
Jenin	76,683
Tulkarem	59,679
Nablus	104,563
Ramallah	70,098
Jerusalem	45,554
Bethlehem	45,471
Hebron	261,665
Jericho	14,744

6.3 Existing Infrastructure

Since the Khadoury site is located within a well developed urban area, the infrastructure to the site is relatively good. The strategic location of the site at the green line and close to the existing border crossing to Israel means that much of the infrastructural connections between Israel and the West Bank for this area pass through the site.

These are described individually below, and are illustrated in Figures 6.8 to 6.14.

Electricity Supply

The peak demand for electricity in Tulkarem at present is 8 MW. There are 3,800 existing subscribers with an average consumption of 360 kWh/month. The electrical supply for the city passes through the KTDC site (22kV overhead line) and this will eventually have to be diverted or laid underground to allow the complete development of the site.

The existing electricity supply for the city of Tulkarem is barely adequate to meet current needs. This represents a challenge to be addressed in the masterplanning of the KTDC.

Telecommunications

The West Bank/Gaza Telecommunications Company PLC (Paltel) with its headquarters at Nablus is the major service provider in the

[1] Source: PA 1997 Census, West Bank Population Report, Table 1, May 1999.

Tulkarem area[2]. It has a sole license for 20 years to construct and operate all telecoms services, with the exception of satellite communications, which are still open to competition.

Paltel is in the process of upgrading the local telecoms network which will include a new international gateway at Ramallah, upgraded backbone infrastructure, and expanded services throughout the West Bank. This will reduce the current reliance on the Israeli Telecom Corporation, Bezeq for IDD and leased lines.

The capacity at Tulkarem in March 1999 was 16,000 capacity, 12,300 working lines, 3,700 free numbers and a waiting list of 280 applicants. All lines are connected to digital local exchanges and are capable of ISDN service.

Paltel provides digital leased lines with speeds of up to 2Mbit/sec. There is a network node at Tulkarem. Paltel plans the provision of 4 Asynchronous Transfer Mode (ATM) switches in the West Bank, but not at Tulkarem. The nearest ATM switch will be at Nablus, and the Paltel high-speed data network plans to provide by the end of the year 2000 the following services at Nablus:

- 250 Frame Relay Subscribers
- 24 Asymmetrical Digital Subscriber Lines (ADSL)
- 760 Dial-up connections

The overall picture for telecommunications is that improved telecoms services are on the way from Paltel, but the current Paltel pricing policy may (as described in section 7.4) require that some innovative alternative services are provided to encourage information rich enterprises to locate at the KTDC. This is discussed in further detail in Chapter 10.

Water Supply

The Tulkarem area enjoys a relatively good water supply with four wells within the city limits capable of providing an overall supply of about 400 m^3/hr. One of the city's wells is within the KTDC site, and this is capable of producing 90 m^3/hr, but due to a high levels of dissolved solids and possibly fecal coliform, this water is not

[2] The sources for the telecommunications information were the 1st Status Report of the Palestinian IT Strategy Study, June 1999 and TSG interviews with Paltel and PA officials.

potable and so will be considered for future use as irrigation water and a source for fire-mains.

The existing potable water lines serving the site are a 2" diameter line on the eastern side of the site and a 1" diameter line on the west side as illustrated in Figure 6.11.

The municipality charges an escalating block tariff for water. Customers that use more than 30 m^3 per month are charged a flat rate of 2 NIS per m^3. This rate is applied to residential users and other non- residential users (commercial and industrial users). There is no wastewater tariff system i.e. subscribers who are connected to sewerage system pay the same rate as the ones who are not connected. However, a connection fee is charged to subscribers which are connected (one time connection fee).

The water quality from the municipality wells is monitored by the Palestinian Water Authority (PWA) and the Dept. of environmental heath at the Ministry of Health. The groundwater aquifer is affected by wastewater infiltration from leaky and poorly maintained trunk lines and cesspools. Nitrate levels and fecal coliform are above standards. Only chlorination treatment units are provided at the well sites. Such treatment facilities do not treat for Nitrate or other chemical/physical pollutants. Salinity is within the required standards, but at high levels that could pose a problem in the future.

It is anticipated that the KTDC will require 400 m^3 per day for all domestic purposes. This is based on 100 liters per person per day. Domestic uses include: drinking, washing, toilet use and flushing, floor cleaning, etc. Non-potable irrigation will require and additional 100 m^3 per day.

However, as mentioned earlier, there is a water well near the DCO (Khadoury Water Well) on the KTDC site. The well is many years old, was hand dug initially and later deepened by a borehole. The well could provide 90 m^3/hr. There is no historic record for the well water quality. One sample indicated high total dissolved solids (TDS) value. It is anticipated that the water will have high fecal coliform (FC) contamination.

Wastewater system

The existing wastewater system consists of two 12" diameter sewers running through the site and discharging to the wastewater ponds currently located across the highway to the north west of the site (see Figure 6.12)

Wastewater collection, treatment and reuse in Tulkarem district is currently being studied by DAR - A German Company - that was retained by KFW, the development finance organization. The feasibility study report was published in September, 1999. According to the Executive Summary of the report, the project time-frame is 30 years and has two phases. The 1st planning phase goes up to 2015 and the 2nd phase extends to 2030. The cost of the first phase treatment only is about 16 Million DM (US$8.6 million). This project will serve Tulkarem District that includes Tulkarem proper and the towns around it.

The location of the proposed Treatment Plant is as indicated on Figure 6.12, which is 3 to 4 km north east of the existing ponds location. The total cost of the project is about 50 million DM. This includes collection system, pumping stations, and reuse network

Since funds are not currently available for this project, the KFW with the municipality of Tulkarem contracted the same company to look into the rehabilitation of the existing ponds near to the KTDC site and other urgent collection matters (emergency study). This study was ongoing at the time of writing.

Road Access

The KTDC site is well served by the existing road network. On the western side of the site is a 30m wide road leading to Natanya and Tel-Aviv. On the eastern boundary of the site is the 20m wide road connecting the site with the city of Tulkarem

Within the site itself there are some existing temporary roads, but these have no significance for the future planning process.

6.4 Cultural resources

The KTDC site represents an important cultural resource that is associated with education and technology. The site contains old buildings and equipment that evidence this heritage. They should be protected to enhance the KTDC’s visual appeal. The old Station Building is elegant and artistic. It should be preserved or moved to be part of the exhibition area in the Admin. Building.

The old water pump in Khadoury well and the old electricity generator (manual) could be maintained/ cleaned and exhibited.

The site is also home to a war memorial and cemetery dating back to the World War 1, and clearly this can not be disturbed.

6.5 Existing use and Ownership

One of the most attractive features of the KTDC site is its existing-use and ownership. With the exception of the area currently being used by the District Coordination Office (DCO) which is designated Area C, the site is completely within Area A. This means that it can be developed within the existing PA planning framework and without approval by the Israeli Authorities.

The overall campus from which the KTDC site is designated is currently used by the Palestinian Technical College, Tulkarem and the Agricultural Faculty satellite campus of An-Najah National University. The proposed boundary is indicated in Figure 6.13, and this boundary encloses approximately 25 ha of land (250 donums). Current uses of the 25 ha designated site include:

1. Citrus Tree Plantation – currently derelict (30 donums) to the south west of the Palestinian Technical College main building.
2. DCO site (28 donums) facing the border crossing point with Israel.
3. Greenhouses belonging to the Agricultural College (1.75 donums).
4. An area occupied by old structures, workshops, cowsheds (18 donums).
5. War Memorial and cemetery (1.75 donums)
6. Green areas (remainder – 120 donums)

6.6 Issues for the planning of the KDTC

The planning of the KTDC site is faced with a number of issues that will have to be addressed in the process. These include:

1. The uses proposed for the Khadoury Technology Development Center are very varied. The accommodation of

such diverse uses within a relatively confined site will require careful planning.

2. The preservation of the campus atmosphere at the site will be a contributory factor to its success. This will present some challenges especially in a landscape where water is relatively scarce and precious, and where development pressure can be high.

3. The phasing of development will have to accommodate the probable continuation of existing uses of the land, and the preservation of antiquities where appropriate.

4. Access to the site (ingress and egress) will be complicated by its proximity to the green line. This is also a positive characteristic of the site that should be fully exploited. The concept of easy public access to the site is also attractive from the perspective of community development and public relations.

5. Infrastructure design will be carried out in difficult circumstances where the status of planned infrastructure projects such as the proposed municipal sewage treatment system is still not clear.

6. Finally, the project should balance the industrial development needs of the community with their educational development needs. The physical design should manifest this partnership between education and industrial development.

The physical masterplan of the KTDC as described in Chapter 10 aims to address these issues in the context of the overall development aims of the KTDC.

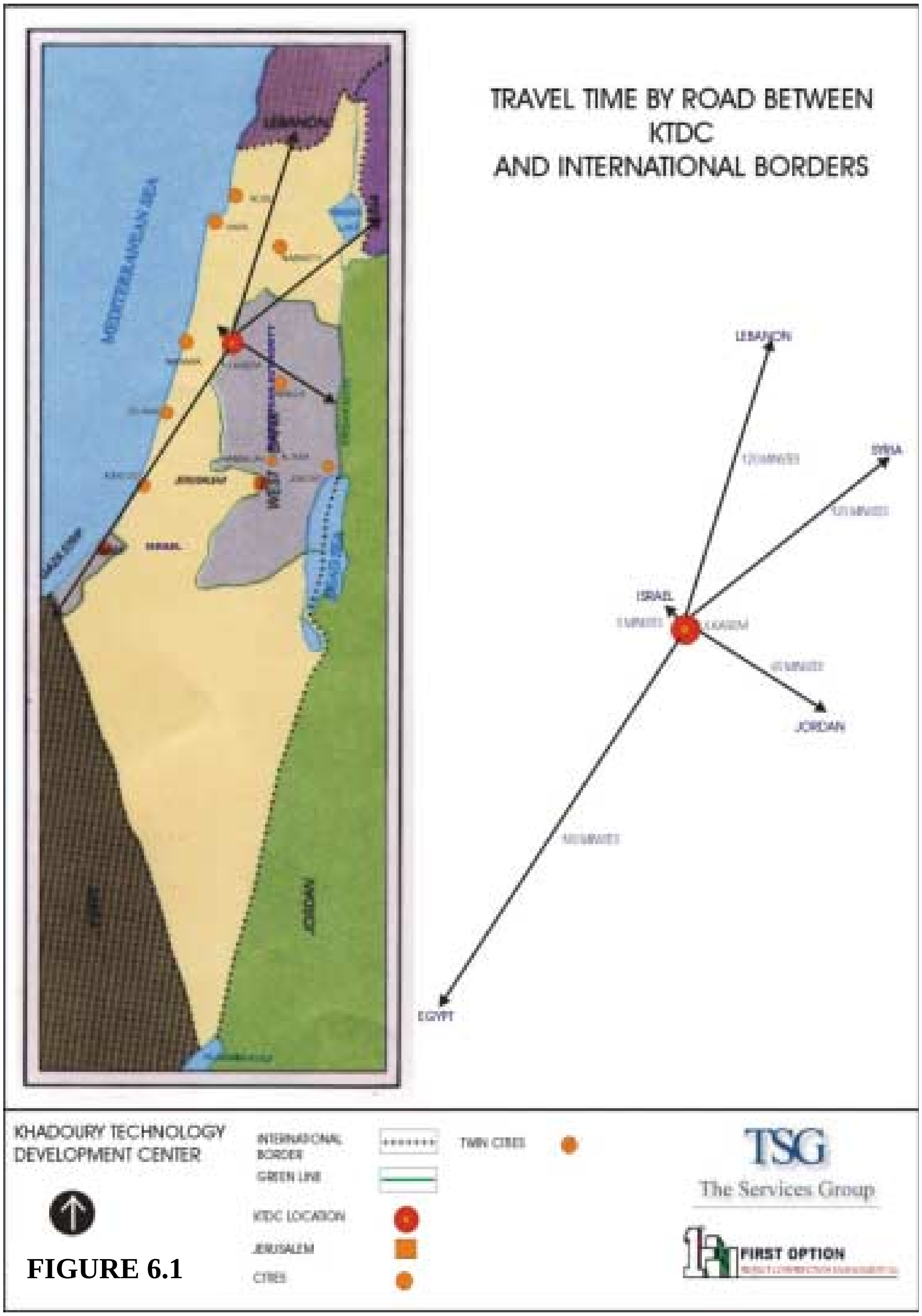

TRAVEL TIME BY ROAD BETWEEN
KTDC
AND INTERNATIONAL BORDERS
LEBANON
SYRIA
ISRAEL
JORDAN
EGYPT
KHADOURY TECHNOLOGY
DEVELOPMENT CENTER
INTERNATIONAL BORDER
GREEN LINE
KTDC LOCATION
JERUSALEM
CITIES
TWIN CITIES
TSG
The Services Group
FIRST OPTION

FIGURE 6.1

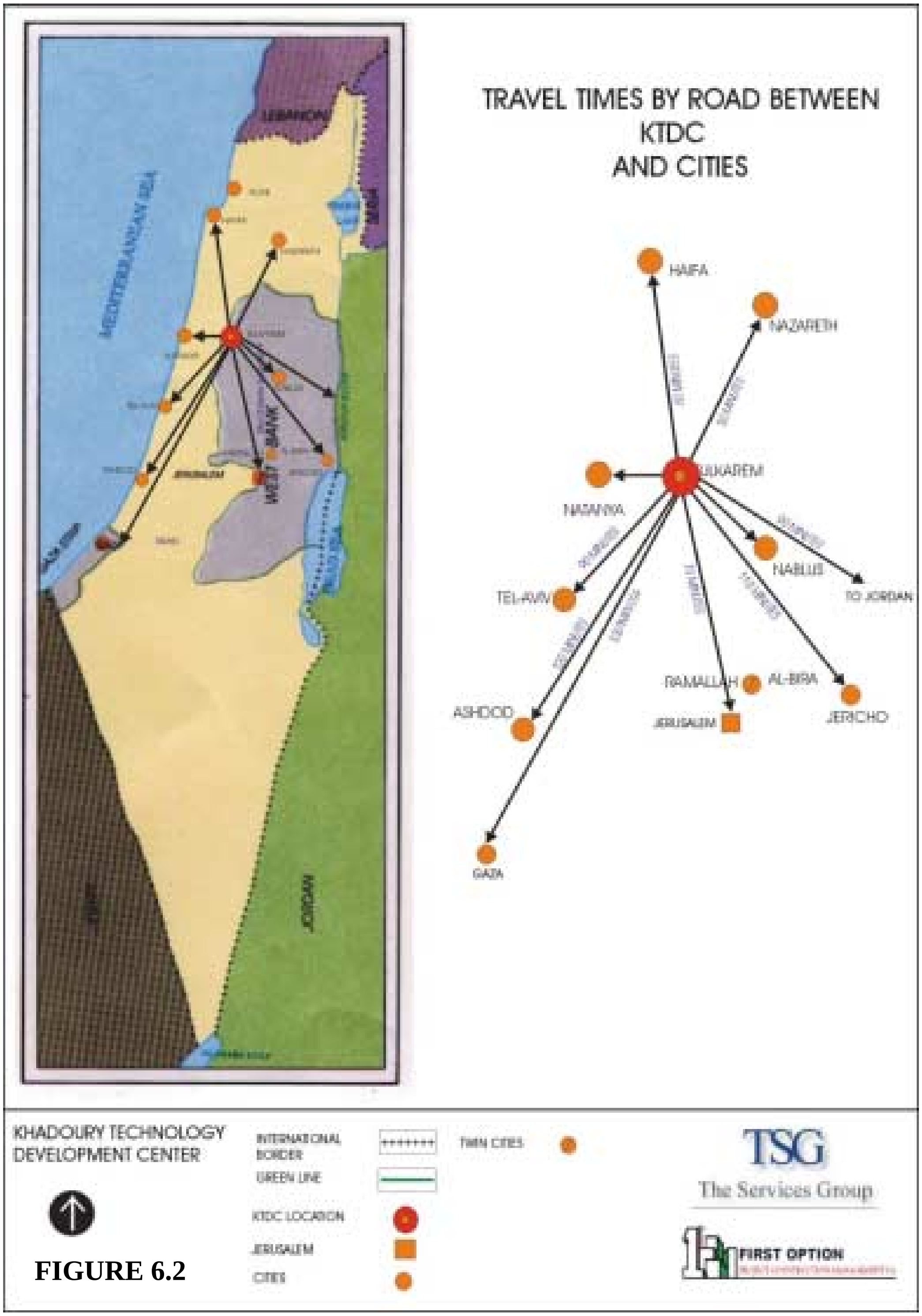

TRAVEL TIMES BY ROAD BETWEEN
KTDC
AND CITIES
HAIFA
NAZARETH
TULKAREM
NATANYA
NABLUS
TO JORDAN
TEL-AVIV
RAMALLAH
AL-BIRA
JERICHO
JERUSALEM
ASHDOD
GAZA
WEST BANK
JORDAN
KHADOURY TECHNOLOGY
DEVELOPMENT CENTER
INTERNATIONAL BORDER
GREEN LINE
KTDC LOCATION
JERUSALEM
CITIES
TWIN CITIES
TSG
The Services Group
FIRST OPTION

FIGURE 6.2

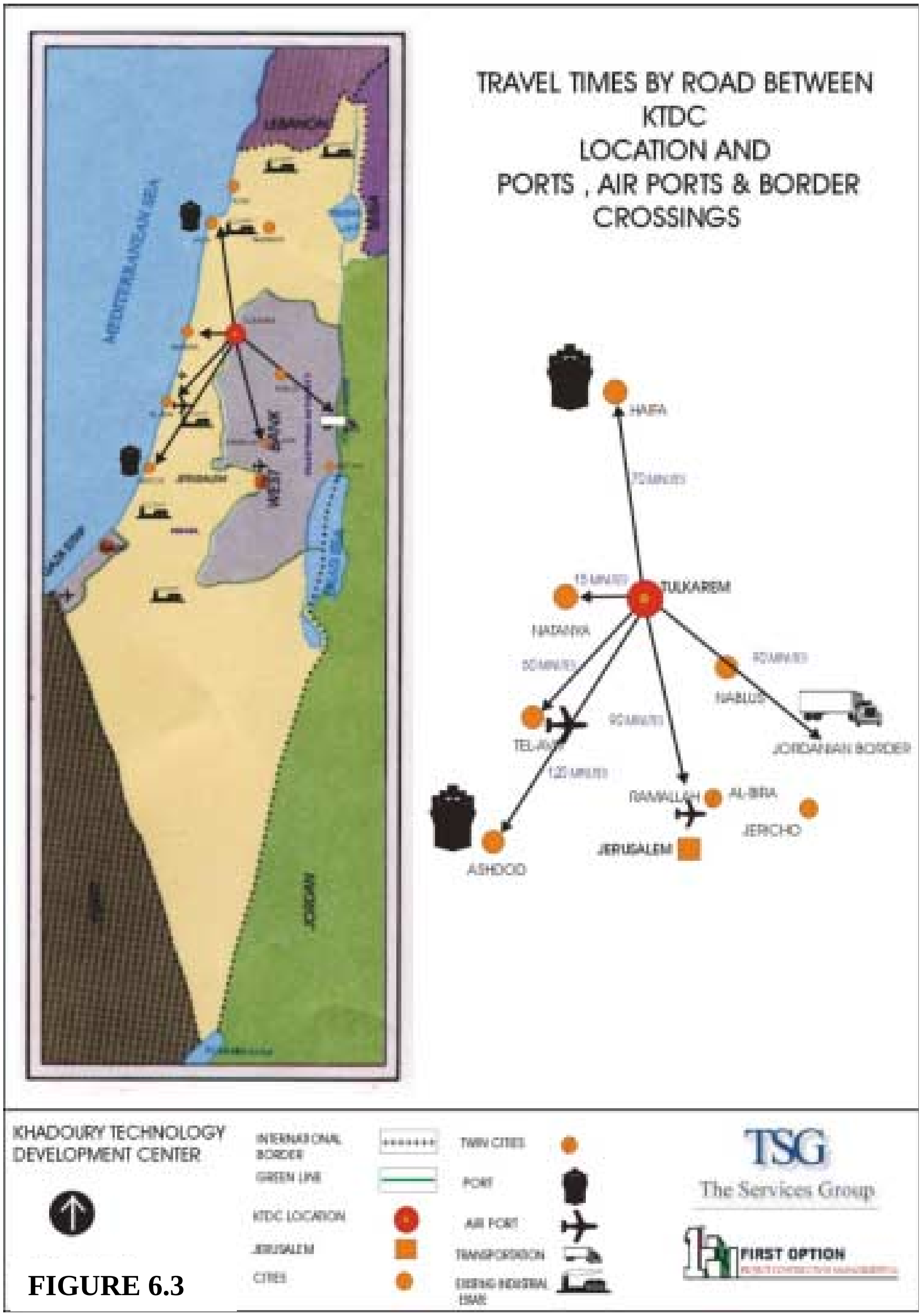

TRAVEL TIMES BY ROAD BETWEEN
KTDC
LOCATION AND
PORTS , AIR PORTS & BORDER
CROSSINGS
HAIFA
TULKAREM
NATANYA
NABLUS
TEL-AVIV
JORDANIAN BORDER
RAMALLAH
AL-BIRA
JERICHO
JERUSALEM
ASHDOD
KHADOURY TECHNOLOGY
DEVELOPMENT CENTER
INTERNATIONAL BORDER
GREEN LINE
KTDC LOCATION
JERUSALEM
CITIES
TWIN CITIES
PORT
AIR PORT
TRANSPORTATION
TSG
The Services Group
FIRST OPTION

FIGURE 6.3

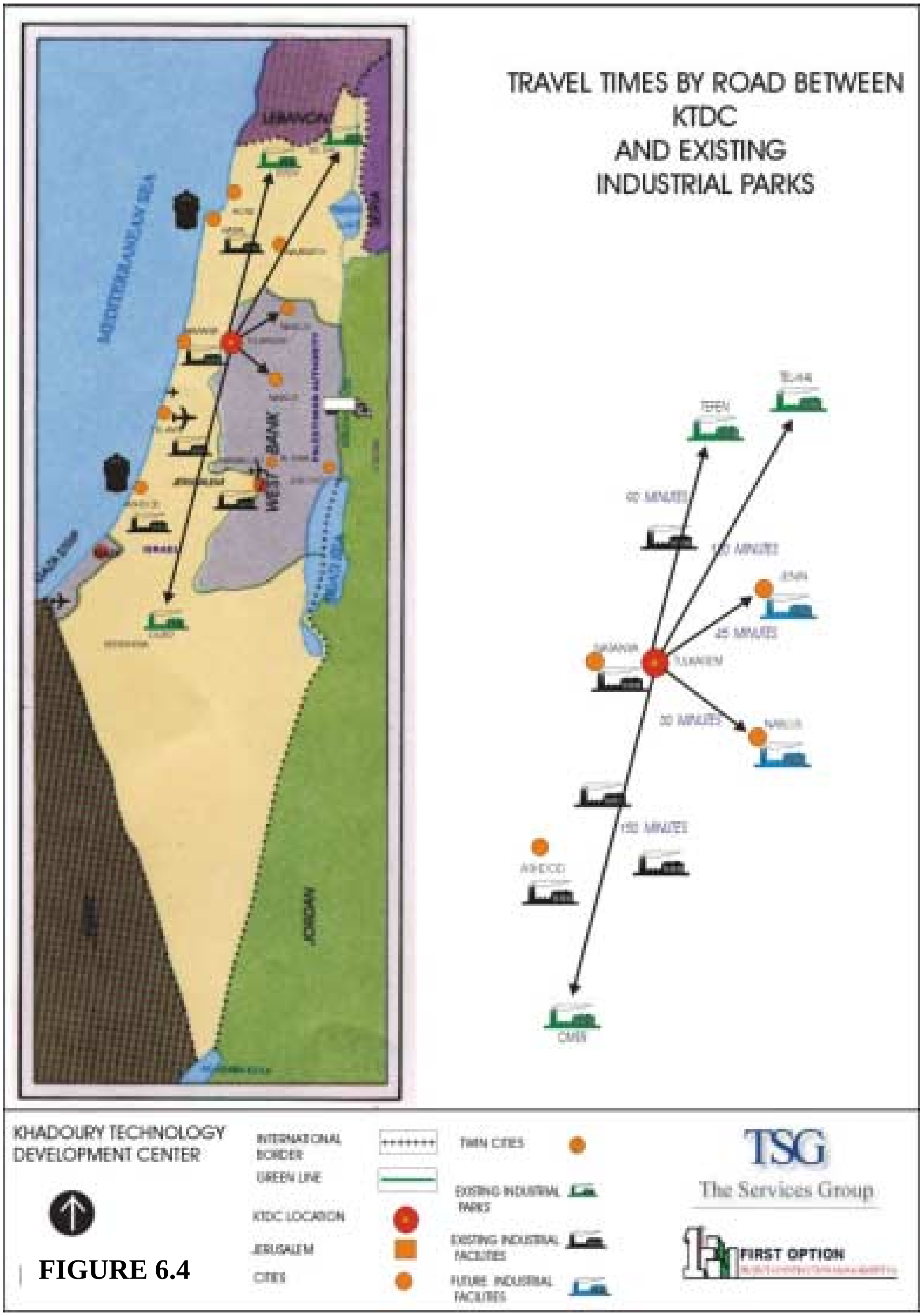

TRAVEL TIMES BY ROAD BETWEEN
KTDC
AND EXISTING
INDUSTRIAL PARKS
LEBANON
MEDITERRANEAN SEA
WEST BANK
JORDAN
90 MINUTES
45 MINUTES
150 MINUTES
KHADOURY TECHNOLOGY
DEVELOPMENT CENTER
INTERNATIONAL BORDER
GREEN LINE
KTDC LOCATION
JERUSALEM
CITIES
TWIN CITIES
EXISTING INDUSTRIAL PARKS
EXISTING INDUSTRIAL FACILITIES
FUTURE INDUSTRIAL FACILITIES
TSG
The Services Group
FIRST OPTION

FIGURE 6.4

KTDC
LOCATION RELATIVE TO
WEST BANK POPULATION
CENTERS

*ANNUAL GROWTH 4%

POPULATION (1996)*			CITY
DIST.	SUB.	CITY	
	90454	86599	JENIN
	98444	62867	TULKAREM
130763	47011	131884	NABLUS
	90384	104458	RAMALLAH & AL-BIRA
241594	23740	27544	JERUSALEM
	78390	34394	BETHLEHEM
106008	115090	73119	HEBRON
	21233	7599	JERICHO

SOURCE:

KHADOURY TECHNOLOGY DEVELOPMENT CENTER

INTERNATIONAL BORDER
GREEN LINE
KTDC LOCATION
JERUSALEM
CITIES
TWIN CITIES

TSG
The Services Group

FIRST OPTION

FIGURE 6.5

KHADOURY TECHNOLOGY
DEVELOPMENT CENTER

SHOWING THE SITE IN GENERAL MAP

TSG
The Services Group

FIRST OPTION

FIGURE 6.6

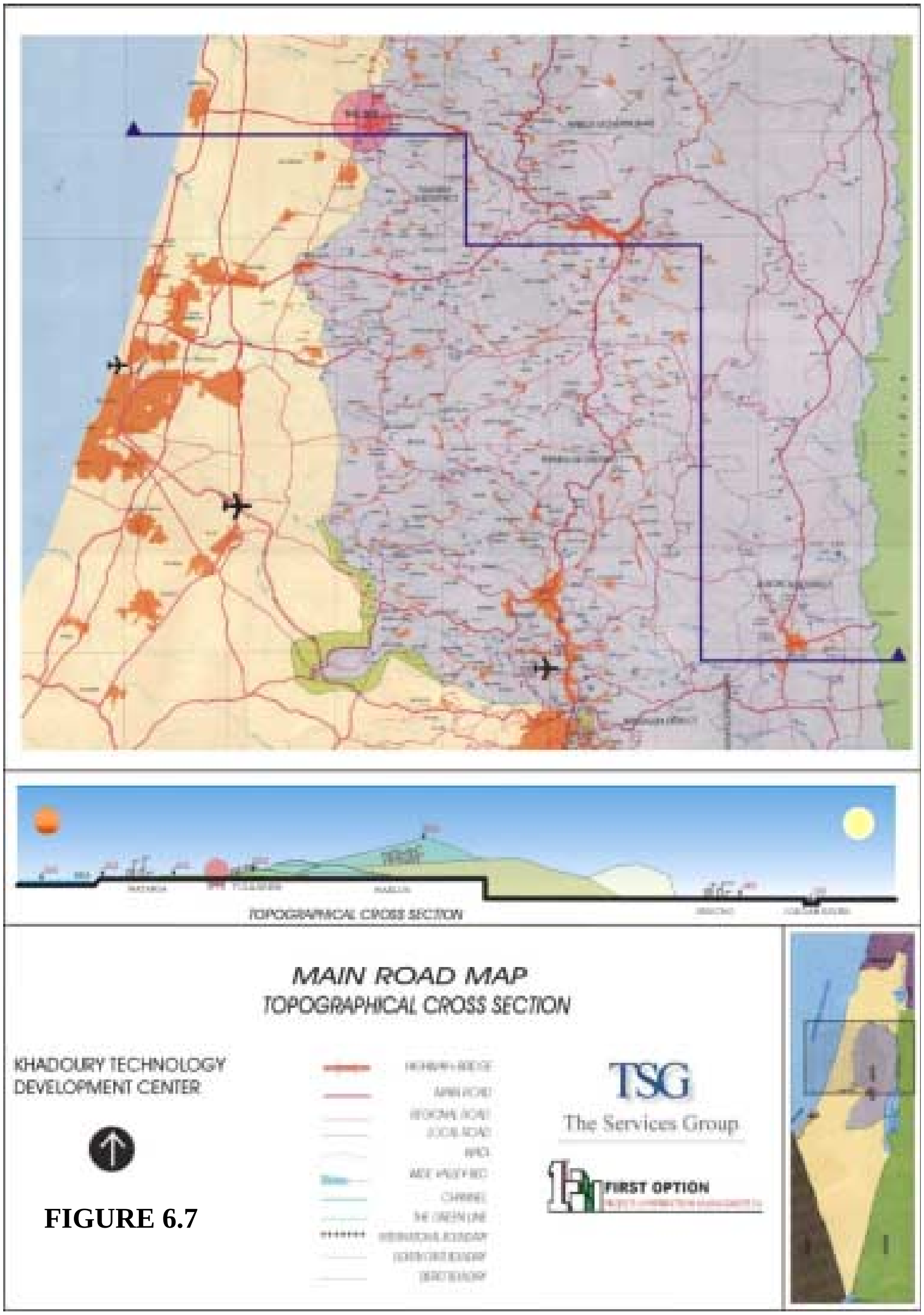

TOPOGRAPHICAL CROSS SECTION
MAIN ROAD MAP
TOPOGRAPHICAL CROSS SECTION
KHADOURY TECHNOLOGY
DEVELOPMENT CENTER
TSG
The Services Group
FIRST OPTION

FIGURE 6.7

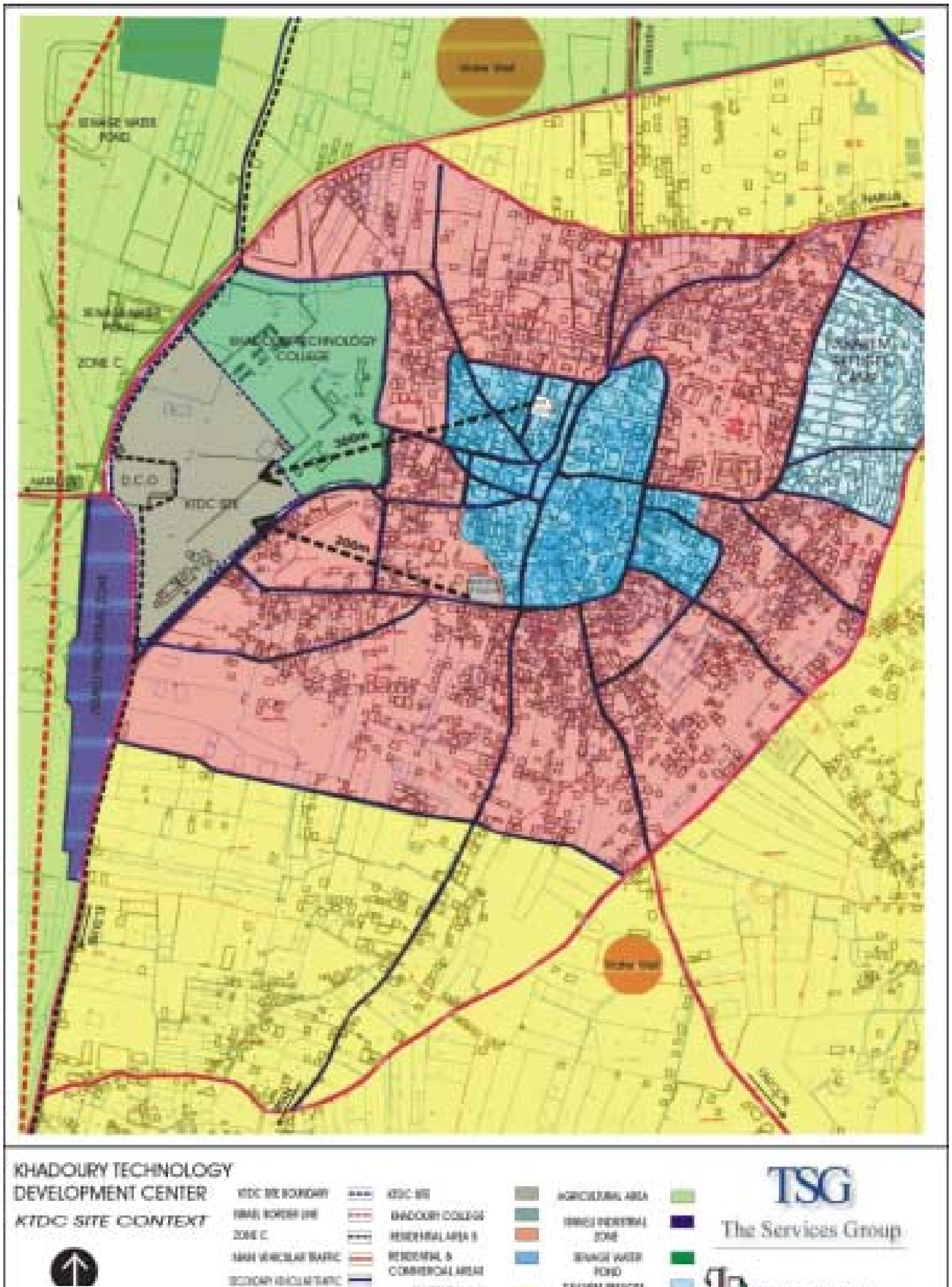

KHADOURY TECHNOLOGY
DEVELOPMENT CENTER
KTDC SITE CONTEXT
ZONE C
KTDC SITE
TSG
The Services Group
FIRST OPTION

FIGURE 6.8

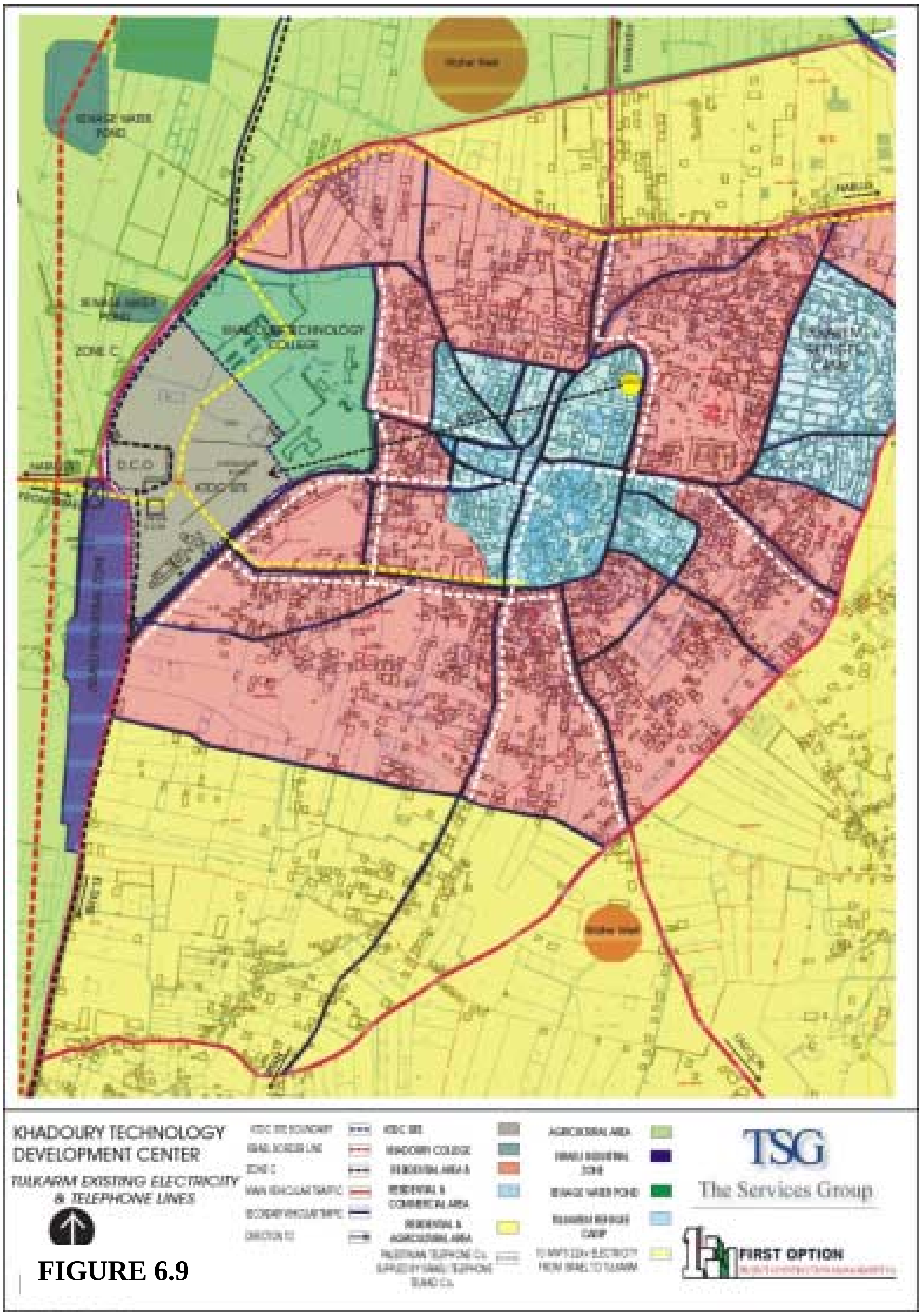

KHADOURY TECHNOLOGY
DEVELOPMENT CENTER
TULKARM EXISTING ELECTRICITY
& TELEPHONE LINES
TSG
The Services Group
FIRST OPTION

FIGURE 6.9

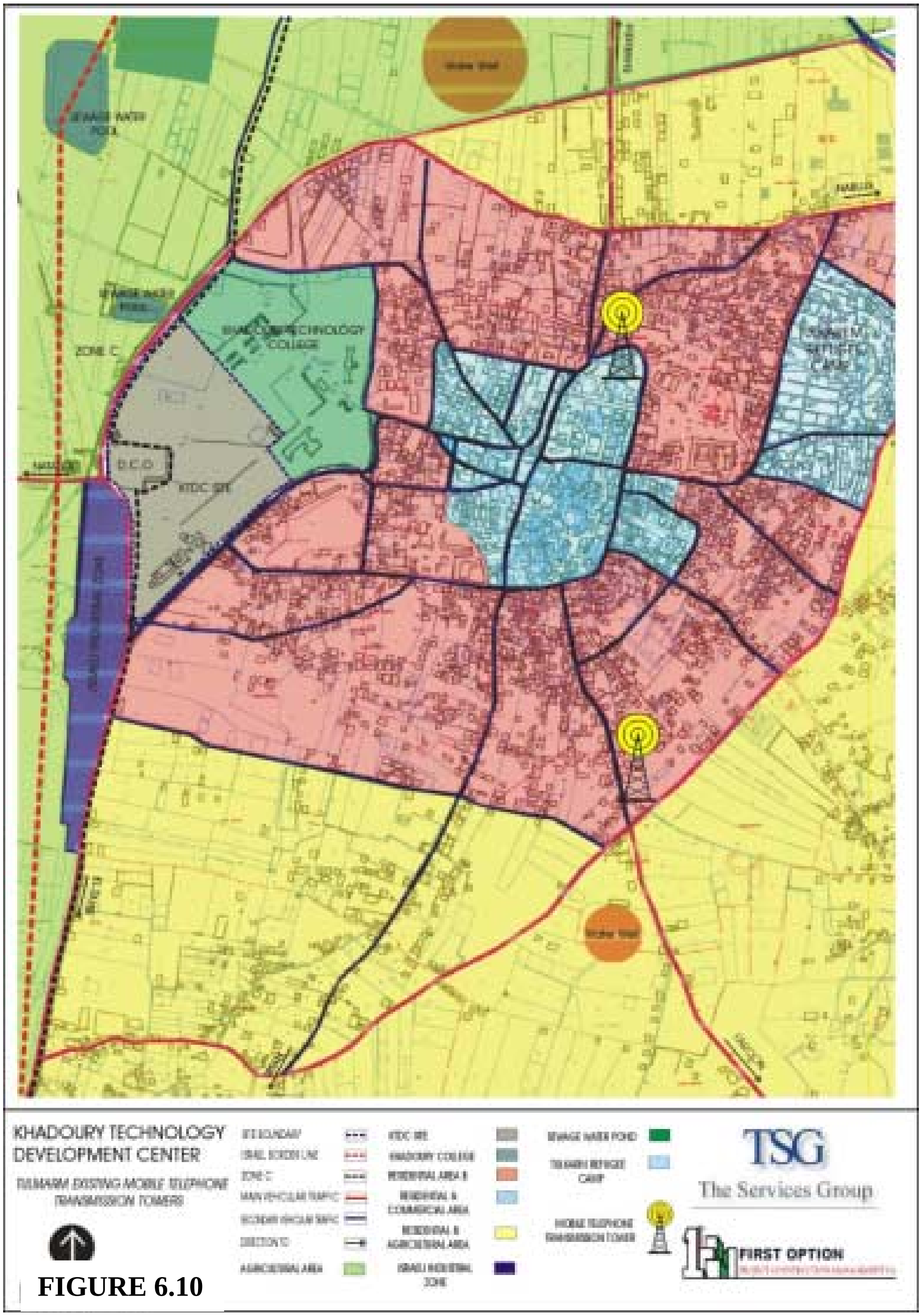

KHADOURY TECHNOLOGY
DEVELOPMENT CENTER
TSG
The Services Group
FIRST OPTION

FIGURE 6.10

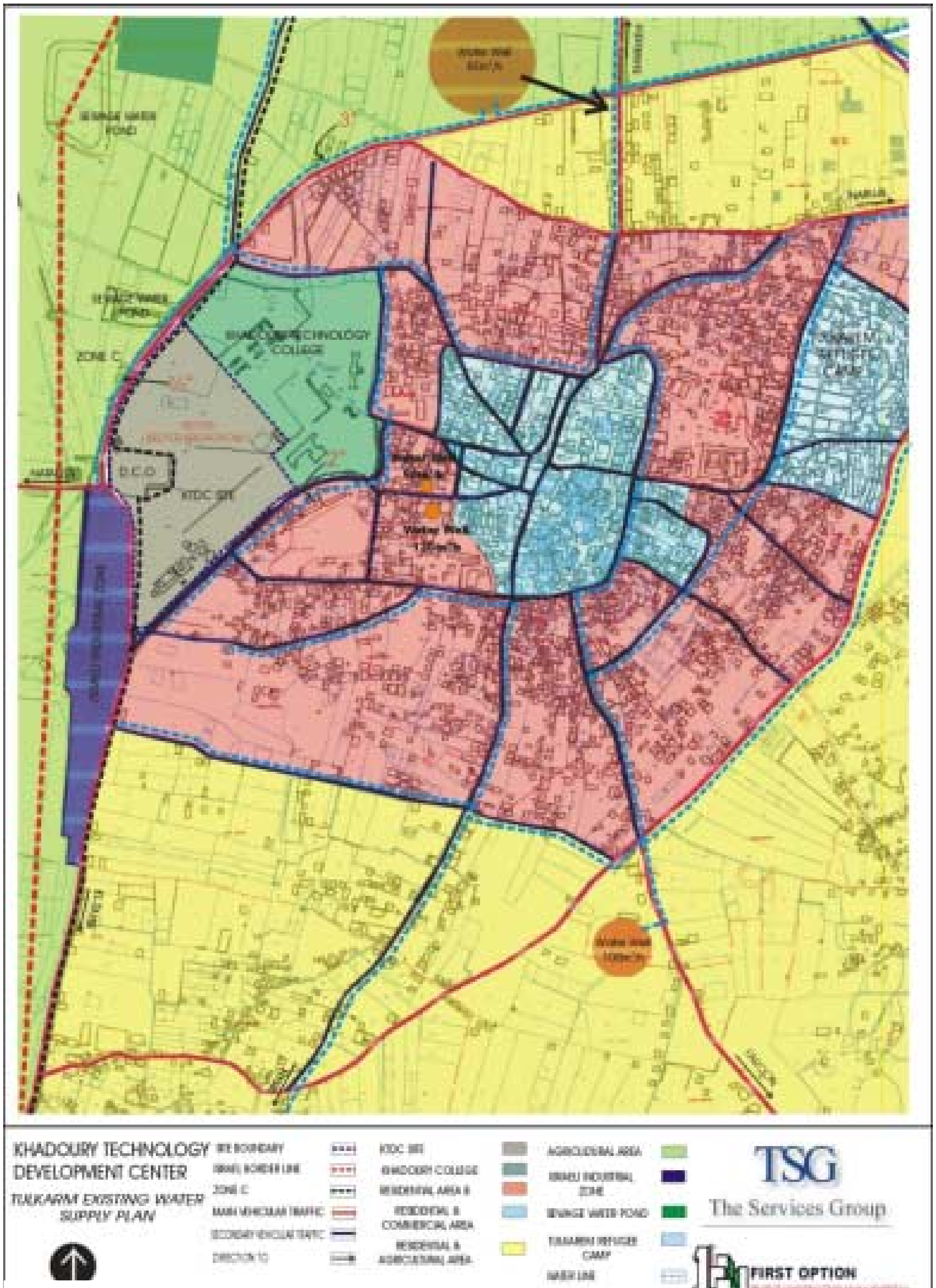

KHADOURY TECHNOLOGY
DEVELOPMENT CENTER
TULKARM EXISTING WATER
SUPPLY PLAN
TSG
The Services Group
FIRST OPTION

FIGURE 6.11

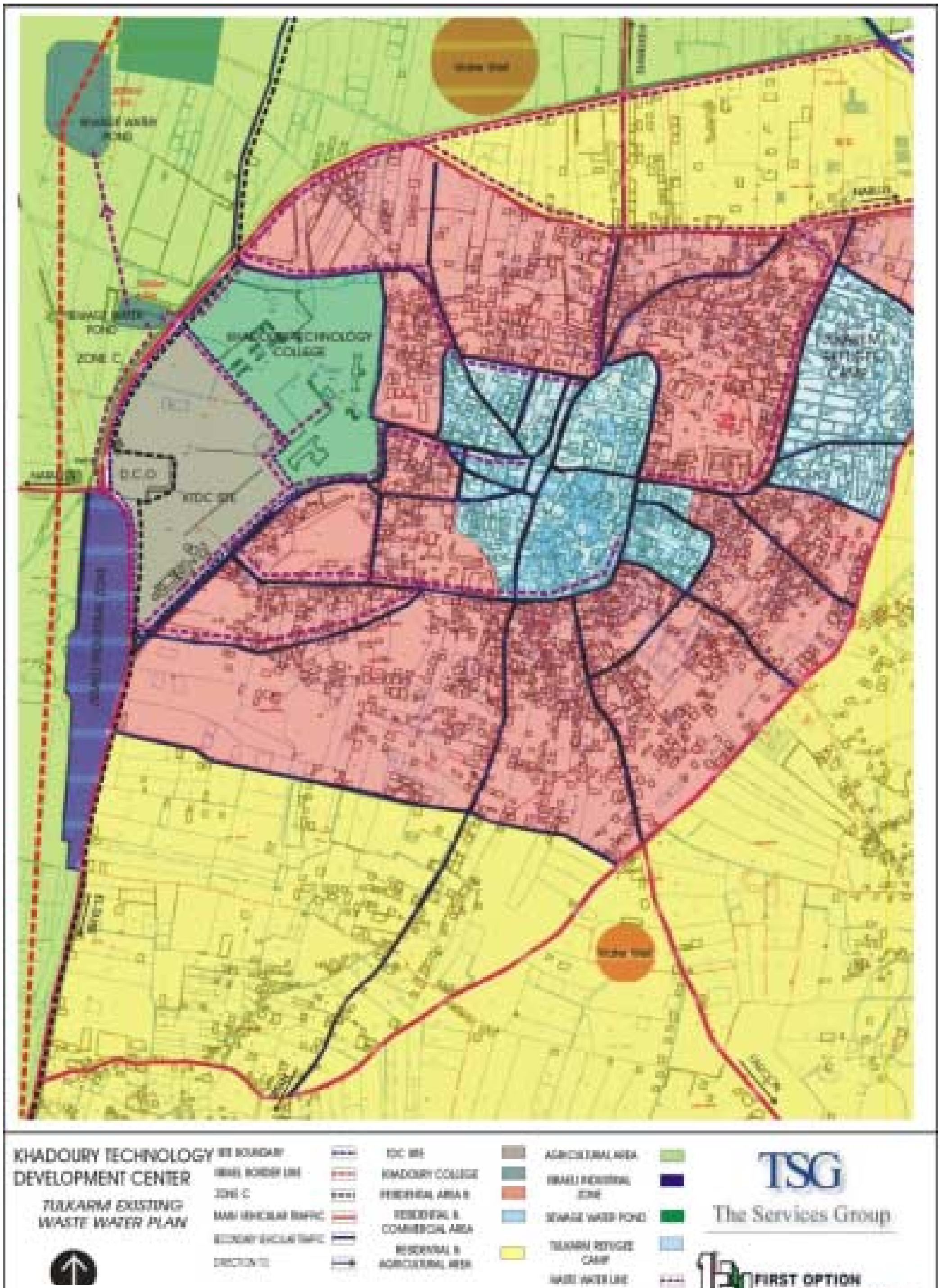

KHADOURY TECHNOLOGY DEVELOPMENT CENTER
TULKARM EXISTING WASTE WATER PLAN
ZONE C
KHADOURY COLLEGE
TSG
The Services Group
FIRST OPTION

FIGURE 6.12


ZONE C
KHADOURY TECHNOLOGY COLLEGE
ISRAEL
ZONE C
D.C.O
ISRAELI INDUSTRIAL ZONE
TULKAREM
KHADOURY TECHNOLOGY
DEVELOPMENT CENTER
KTDC SITE - EXISTING USES
TSG
The Services Group
FIRST OPTION

FIGURE 6.13


ZONE C
ISRAEL
ZONE C
D.C.O
KHADOURY TECHNOLOGY COLLEGE
ISRAELI INDUSTRIAL ZONE
TULKAREM
KHADOURY TECHNOLOGY
DEVELOPMENT CENTER
KTDC EXISTING SERVICES
TSG
The Services Group
FIRST OPTION

FIGURE 6.14

7. Positioning the KTDC: Competitive Benchmarking

7.1 Introduction

This chapter examines, from a site seeker's perspective, the basic competitiveness of the KTDC as an investment location vis-à-vis other technology parks or developments in the Middle East. Companies tend to place their production facilities in locations whose comparative resource endowments most closely match their own technical requirements, thus enabling them to minimize production and transaction costs per unit of output. This chapter focuses on the requirements of technology-oriented sectors.

The KTDC possesses several characteristics that make it a potential destination for technology-oriented enterprises, including:

- access to a growing pool of competitively priced programmers, engineers, and technicians; and

- a favorable investment environment, with an attractive package of incentives for KTDC-based enterprises.

In addition, the KTDC's strategic location on the Green Line, with easy access from Israel, makes it a more favorable location vis-à-vis many other sites in the West Bank region. In order to maximize its potential in attracting technology-oriented investment, however, the KTDC will have to ensure that it can provide world-class, low-cost telecommunications infrastructure, an important prerequisite for technology-oriented companies.

7.2 Factors and Sites for Analysis

Factors for Analysis

The comparative analysis exercise is designed to assess a location's relative assets and liabilities from an investor's point of view. The process includes a series of general comparisons to other locations in factors most likely to shape the corporate location decisions of potential investors. The result is a clear picture of the KTDC's comparative advantages and disadvantages. The following factors have been identified as important criteria for high-tech sectors:

- the availability and cost of human resources;
- the quality and cost of utilities, including electricity, water, and waste disposal;
- the quality and cost of telecommunications
- transportation infrastructure and costs
- land and building costs; and
- the investment environment, including taxation and incentives for investment.

Sites For Analysis

The KTDC is compared, when appropriate, to alternative sites for technology-oriented investment in the Middle East region, including technology parks and development centers in Israel, Egypt, Jordan, Turkey, and Dubai. While there are other locations outside the region that may provide a more favorable environment for technology-oriented enterprises - such as India, Ireland, or the United States - the KTDC's direct competitors for investment are in the Middle East.

The specific locations within the region selected for benchmarking include the following:

Israel

Israel provides a sound model for how to develop technology based industrial parks and R&D centers in the Middle East. In a relatively short amount of time, Israel has managed to become a technologically independent nation, as well as a world and a regional leader in several computer and hi-tech fields. Resources and expertise critical to the development of hi-tech parks exist in Israel and may be utilized by the Palestinians. In addition, given the KTDC's close proximity to Israel's technology corridor, the

KTDC will compete directly with Israeli parks for Israeli and Israel-based investment. The following two technology parks were selected for benchmarking purposes:

- **Matam Industrial Park.** Matam R&D park is located in Haifa, at the heart of the country's main industrial and technological region. Today, it is the largest technology park in Israel, with 4,500 employees and 45 hi-tech companies including Elron, Microsoft, Intel and IBM. The park is owned by MTM Scientific Industries Centers, which also sponsors an incubator program, together with Elron Electronics. More than 50 percent of the park's tenants are engaged in computer-related industries, including both hardware components and software development. Other industries include biotechnology, medical equipment, and electro-optics.

- **Atidim Hi-Tech Park.** Atidim Hi-Tech Park is Tel-Aviv's principal high-tech park. It was established in 1972 in cooperation with the Municipality and Tel-Aviv University. The park maintains 11 buildings occupied by 85 high-tech companies that employ 3,500 people. It is currently situated on 90 acres of land in north Tel Aviv. Park tenants represent a wide range of high-tech industries, including biotechnology, hardware and software development, electronics, and medical equipment.

Turkey

While the development of Turkey's technology parks have been slow and difficult, increased government assistance and private-sector cooperation have aided their development in recent years. Two parks are currently in operation and three others are under development. Turkey's parks - with their strategic location between the Middle East, Europe and Central Asia – are likely to emerge as competitors for IT companies interested in accessing regional markets.

- **Marmara Research Center.** Marmara Research Center- one of Turkey's two leading technology parks - was established in 1972 to conduct research and development as an arm of

TUBITAK, the Scientific and Technical Research Council of Turkey. The Center is located on a 750 hectare site, 50 kilometers east of central Istanbul. Presently, the Center is staffed by some 750 personnel, with researchers making up more than 50 percent. Research areas range from informatics to genetic engineering and biotechnology to chemical engineering. The park hosts an Innovation Center, an incubator-style program, which currently supports 15 companies.

- **Aegean Free Zone Technopark, Turkey.** The Aegean Free Zone, was founded near Izmir, Turkey's second largest city and port. The Zone is a modern industrial park that encompasses 220 hectares and houses nearly 500 companies. AFTZ is building a technology center on site, which includes a library, conference hall, computer lab, and research and testing facilities. It will help connect Turkish companies with foreign high-tech firms and will provide equity financing for new enterprise development.

Dubai

Beginning in the 1990s, the U.A.E. has developed several free zones. Although not strictly a technology park, one of these free zones, **Jebel Ali**, has been tremendously successful in attracting technology-based industries, including many global technology leaders such as Acer, Sony, Grundig, Nokia, IBM, Compaq, Bose, JVC, and Samsung. Jebel Ali's superior transportation infrastructure and strategic location make it a favorable manufacturing and services hub, servicing the Middle East, Asian and European markets.

Egypt

In 1998, the government has designated two 'technology valley' programs priority projects. Egypt, already accommodating a large software industry, plans to raise its high-tech exports with the help of these projects. The **Sinai Technology Valley,** located in northern Sinai, 10 kilometers east of Ismailia is still its first phase of development. The infrastructure for the first phase is due for completion by the end of 1999. When completed, it is planned to house IT firms, feeder industries, research and development institutions, and service companies and has the potential of becoming a strong competitor for IT investments.

Jordan

The city of **Amman** is rapidly becoming a center for technology-oriented activities in Jordan, including software development and engineering services, as well as several incubator programs. In addition, a new initiative, REACH, has been launched to develop a comprehensive framework for IT development in Jordan, including the establishment of a technology park and the expansion of venture capital funding for start-ups.

7.3 Human Resources

The success of knowledge-driven and technically specialized industries is strongly dependent on the availability and cost of qualified labor. The establishment and/or expansion of technology-related industries in a given locale requires a large and affordable supply of computer science, engineering, and technical professionals.

Labor Skills

The supply of qualified Palestinian workers is growing as the number of graduates exiting from relevant programs – at both the university and technical college level – continues to grow. In 1997, there were approximately 1,600 students enrolled in university-level computer science programs, 900 in relevant engineering programs (including electronic engineering, electrical engineering, information systems engineering, and computer systems engineering), and 180 students enrolled at Palestinian technical colleges in the relevant disciplines (electrical engineering, telecommunications, computer technology, and technology of radio, television & video). However, while IT training is a fast-growing sector in West Bank, growing at an estimated 15 percent per annum, there continues to be a shortage of relevant post-graduate training programs, particularly computer language and system training and certification programs.

TSG findings, based on interviews with deans and faculty members in the universities and technical colleges, indicate that most graduates from these programs have little difficulty in finding jobs upon graduation, though many are considered "underemployed" as they are unable to maximize the potential provided by their education. However, the findings of this study indicate that, while graduates possess a strong theoretical background, most lack the practical training that can only be provided through direct industry experience. Nevertheless, those who have worked with local graduates – including both local and Israel-based employers – confirm that they are highly capable once provided with the requisite training. At the same time, other regions with high rates of technology development are experiencing shortages of qualified labor, particularly computer programmers. Israel, for instance, currently has a shortage of 3,000 programmers and engineers and is looking to other countries to fill the widening gap.

Cost of Labor

In terms of labor costs, the KTDC will be competitive with the other technology-oriented investment locations in Israel, Egypt, and Turkey (see Figures 7.1a, 7.1b, and 7.1c below). For the KTDC, the average monthly salaries of computer software programmers with five years experience, will be approximately $1,100 per month (based on the average salaries in the West Bank), substantially lower than in most of the comparator locations, which range from US$1,750 per month in Marmara and Aegean Technoparks to US$3,500 per month in Matam and Atidim. However, computer programmers' salaries are significantly lower in Amman and Sinai, where salaries average US$325 and US$350 per month, respectively.

KTDC-based enterprises can expect to pay between US$1,200 and US$1,500 per month for qualified engineers, which is relatively competitive with salaries in Marmara, Aegean, and Jebel Ali, and significantly lower than in Matam and Atidim, where experienced engineers cost, on average, US$4,500 per month. However, as in the case of programmers, enterprises in Amman and Sinai can expect to pay far less for experienced engineers, ranging from US$725 in Amman to US$950 in Egypt.

Figure 7.1a
Average Salaries for Computer Programmers

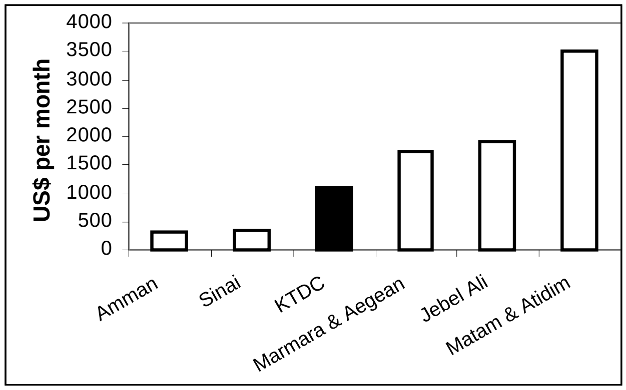


Figure 7.1b
Average Salaries for Engineers

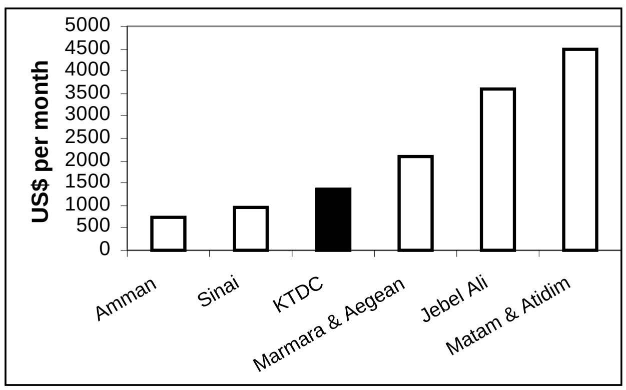
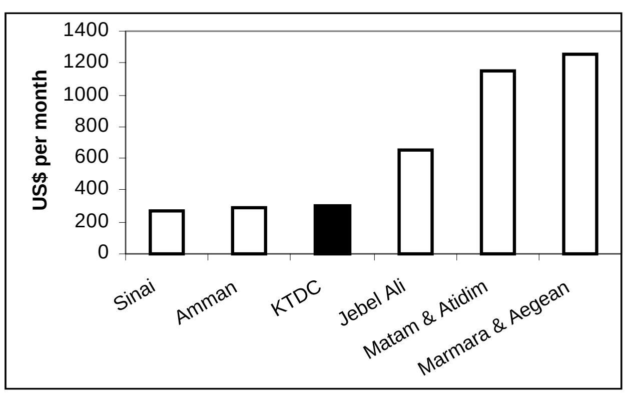


Figure 7.1c
Average Salaries for Technicians



Similarly, the cost of technicians for KTDC-based companies will be significantly lower than salaries in most of the other locations, ranging from US$250 to US$350 per month. Technicians' salaries are highest in Turkey, averaging US$1,250 per month. However, once again, the average salaries for technicians are lowest in Sinai and Amman, where monthly salaries range from US$270 to US$290, respectively.

Implications for Technology-based Industries

In terms of the availability and cost of qualified labor, the KTDC can provide a favorable location for technology-oriented industries. While locations such as Israel are experiencing severe labor shortages, the KTDC's access to the growing supply of relatively low-cost, qualified labor in the West Bank provides it with the opportunity to meet such manpower gaps, though it must compete with alternative locations in Jordan and Egypt where labor costs are substantially lower. However, training facilities and development programs need significant improvement, a role that can be fulfilled directly by the KTDC through on-site training programs oriented toward industry needs. Specific recommendations regarding on-site training opportunities are provided in chapter 9 of this report.

7.4 Utilities

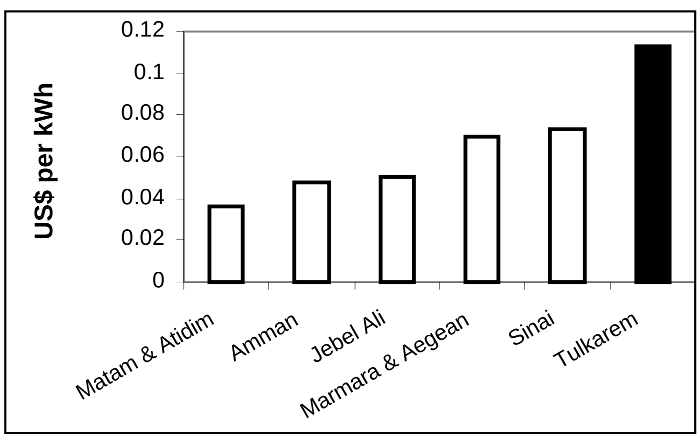
The quality and cost of utilities - including electricity, water, and telecommunications – are an important consideration for technology-oriented industries and can add significantly to an enterprise's operating costs. Today's higher-end technologies require uninterrupted utility services and any breakdown in the supply can reduce efficiency and, thus, profitability. The KTDC must provide higher quality, lower cost utilities than is available elsewhere in the West Bank in order to meet the demands of technology-oriented enterprises.

Electricity

The West Bank imports most of its electricity from Israel. Discussions with the Tulkarem Municipality indicated that its own power supply would be inadequate to meet the needs of the KTDC. The lack of adequate physical infrastructure for electric power and consequently, insufficient power supply, have in the past caused work stoppages in Tulkarem-based firms. Instead, the KTDC will need to obtain its own direct supply from the Israeli grid in order to ensure a reliable supply of electricity to its tenants.

While electricity rates cannot be set until the new infrastructure is in place, the tariff structure in Tulkarem is indicative of the electricity tariffs on offer throughout West Bank. The current tariff rate for commercial and industrial users is U$0.113 per kWh, which is considerably higher than all the other locations under review (see Figure 7.2 below). In Turkey, Marmara and Aegean Technoparks offer rates between US$0.056 and US$0.097 per kWh; in Egypt US$0.07 to US$0.075; in Jordan 0.029 to 0.067 and in Matam and Atidim, rates are approximately one-third of those in Tulkarem, between US$0.034-0.036.

Figure 7.2
Average Electricity Tariffs (peak hours)

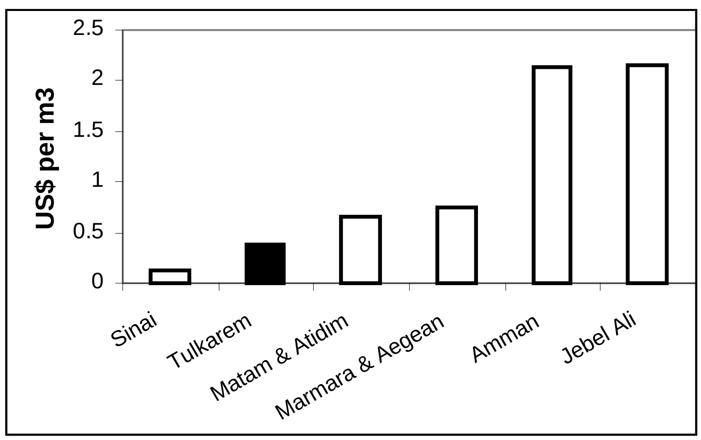


Water

In the West Bank, annual use of water resources remains at 1973 levels and must be expanded to sustain private sector development. Discussions with the Tulkarem Municipality indicated that its own resources would be insufficient to meet the needs of the KTDC, which would, instead, need to dig its own well to supply its tenants. New wells require the approval of Israeli authorities.

The cost of water in Tulkarem, which is indicative of tariff rates that are on offer throughout the West Bank, is US$0.38 per cubic meter. This is relatively competitive with other locations in the region (see Figure 7.3 below), with the exception of Egypt where water is priced far below market value despite ongoing shortages.

Figure 7.3
Average Water Tariffs



Waste Disposal

Both waste water treatment and solid waste disposal services are inadequate throughout the West Bank, the Tulkarem Municipality included. For waste water, the Tulkarem region lacks treatment facilities. Instead, the Municipality maintains collection ponds, from which wastewater is currently pumped to an Israeli settlement, where it is treated and used for irrigation. The Municipality charges a US$143 connection fee for waste water disposal, as well as 60 percent of the cost of the connection line. While there are no running fees currently for waste water disposal, with the upcoming introduction of a primary treatment facility, to be constructed with assistance from Germany, running fees will be introduced to cover operating costs.

In terms of solid waste disposal, the Municipality operates four compressor trucks, which dispose of all solid waste into an unlined dump in the southern part of the Municipality. Volume is currently controlled through open burning. Commercial collection fees are US$36 per year. However, there are plans to re-locate the site, and to construct a sanitary landfill and install modern separation equipment, again with the assistance from Germany.

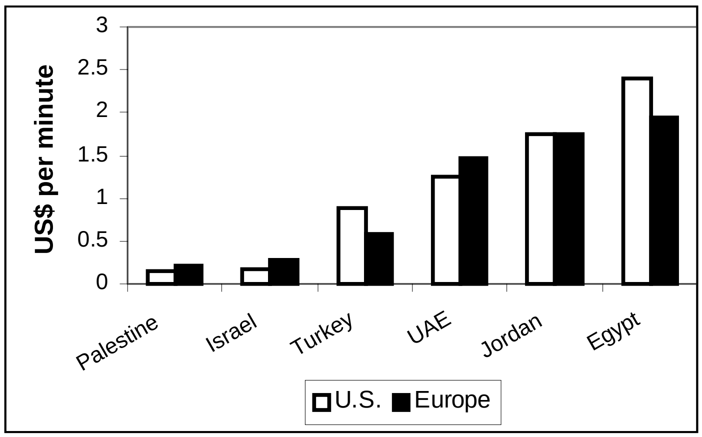
Telecommunications

Technology-related industries – particularly the information technology sector – are highly dependent on access to "virtual transportation", including quality voice and data communications services. The Palestinian Telecommunications Company (PALTEL) is the privately-owned, national provider of all regular land-based and cellular communications in West Bank/Gaza, over which it has been granted a 20-year monopoly. While the existing infrastructure is largely inadequate, PALTEL plans to significantly upgrade it over the next few years – including its own international switches, an earth station, a leased digital circuits network, and high-speed backbone. Such an ambitious plan would significantly improve telecom services in West Bank/Gaza. However, the Ministry of Posts and Telecommunications regulates the pricing for PALTEL's services, which can impede PALTEL's ability to provide competitively priced services.

Furthermore, West Bank/Gaza currently has no international switches of its own and must, instead rely upon Israeli infrastructure. Both leased lines and international direct dialing is routed through Bezeq's system (Bezeq is one of Israel's three telecommunication companies). While direct dialing rates to locations outside the region are relatively competitive, as demonstrated in Figure 7.4 below, direct dialing rates from West

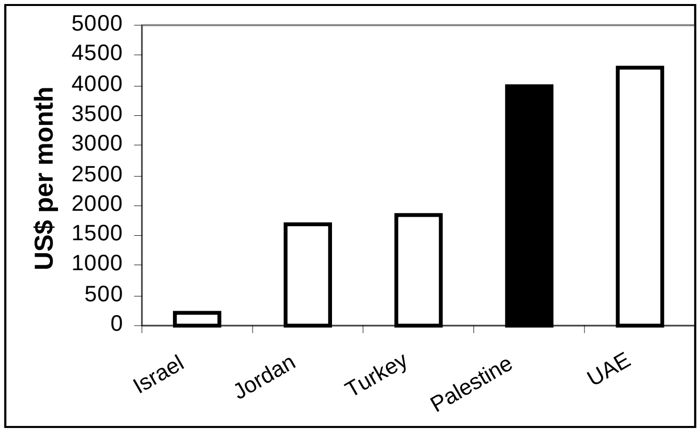
Bank to its Arab neighbors are inordinately high, ranging from US$0.69 per minute to Jordan to US$0.99 per minute to Egypt to US$1.20 to most other countries in the region. In the future, however, the Ministry hopes to reach an agreement with four of its neighbors (Jordan, Egypt, Sudan and Qatar) to utilize their exchanges for inter-regional calls, which could reduce prices by up to 30 percent.

Figure 7.4
Average IDD Tariffs to U.S. and Europe (peak rates)



While direct dialing rates to the U.S. and Europe are relatively competitive, the cost of dedicated leased lines are substantially higher than in most of the alternative investment locations (see Figure 7.5). While PALTEL must negotiate on behalf of individual companies with Bezeq for international leased line connections, on average a 64 kbps line to the U.S. would cost a KTDC-based enterprise US$4,000 per month, compared to US$1,830 in Turkey, US$1,700 in Jordan and a low US$200 in Israel. Only in Dubai are leased lines higher than in West Bank/Gaza, averaging US$4,300 per month. Similar price differentials apply to other international destinations, as well as different access speeds.

Figure 7.5
Average Tariffs for Leased Lines to U.S.



Implications for Technology-based Industries

The cost and quality of utilities on offer at the KTDC, particularly electricity and telecommunications, will have to be significantly improved if it is to maximize its potential to attract technology-oriented investment.

While there are planned investments for upgrading the current power infrastructure in the West Bank, the existing situation, with inadequate power infrastructure and high tariff rates, would be disadvantages for the KTDC. Instead, the KTDC must ensure, through its own bulk connection to the Israeli power grid, a reliable electricity supply at concessionary tariff rates, closer to international standard rates. In addition, while KTDC-based enterprises are not likely to be significant users of industrial water or waste disposal systems, an adequate supply of potable water, as well as modern waste disposal systems, should be provided to park tenants.

In terms of telecommunications, while PALTEL maintains its monopoly over regular and cellular services, the construction and operation of satellite communication services are open to potential competitors. An on-site teleport at the KTDC, providing export-oriented services, would be essential to ensure the required access to high-quality data and voice communications (which would not compete with PALTEL's services outside the park). While the Ministry is unlikely to yield its right to regulate pricing of all regular telecommunication services in West Bank/Gaza, the Ministry would need to give a freer-hand to a KTDC-based teleport operator, particularly in terms of pricing, in order to ensure access to competitively priced, quality telecommunications.

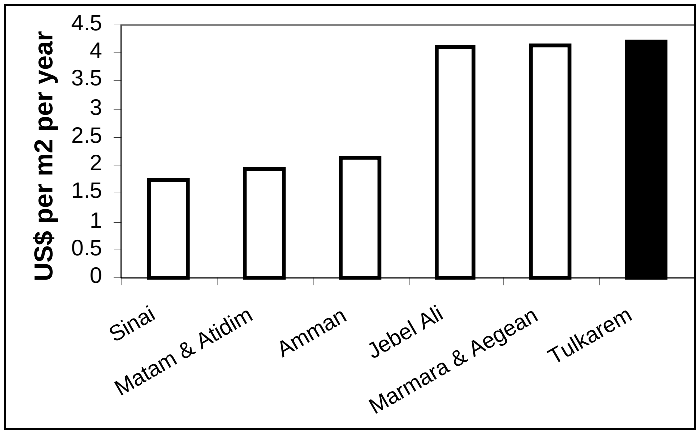
7.5 Land and Buildings

The provision of fully serviced industrial estates can provide a strong incentive to investors, reducing the time and effort required to establish a physical presence and providing cost savings through various incentive schemes, and, in some cases, concessionary land and building lease rates.

While land and building lease rates will be established separately for the KTDC, lease rates in the Tulkarem district provide an indication of the existing real estate market. Overall, land and building lease rates are relatively high in Tulkarem when compared to alternative investment locations in the region (see Figures 7.6a, 7.6b and 7.6c). The lease rate for serviced land in Tulkarem is, on average, US$4.20 per square meter per year. While this is significantly lower than at the Gaza Industrial Estate, where lease rates are as high as US$8.00 per square meter per year, and competitive with lease rates in Jebel Ali and the two parks in Turkey, it is still higher than many other locations in the region. Serviced land is approximately half the price in Sinai, Amman, and Matam and Atidim in Israel.

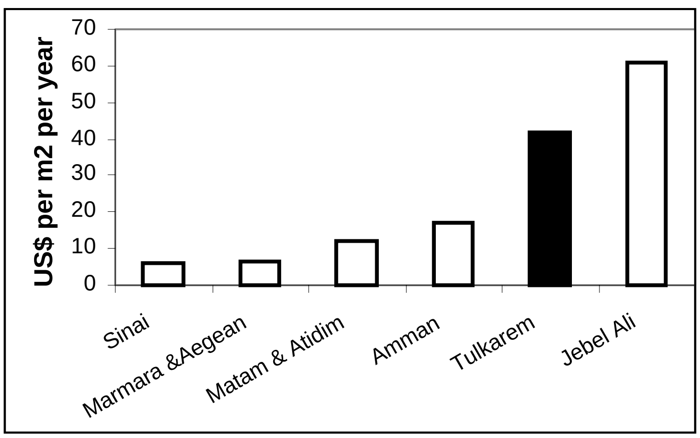
The lease rates for standard factory shells and office space are also relatively high in Tulkarem, compared to many of the other locations under evaluation, where leases are offered at concessionary rates. In Tulkarem, standard factory buildings lease for US$42 per square meter per annum, compared to an

Figure 7.6a
Average Lease Rates for Serviced Land



average US$19 in Amman,[1] US$12 in Israel's technology parks, US$6.50 in Turkey's, and a low US$6 in Egypt. Only in Jebel Ali is factory space more expensive, where lease rates average US$61 per square meter per annum.

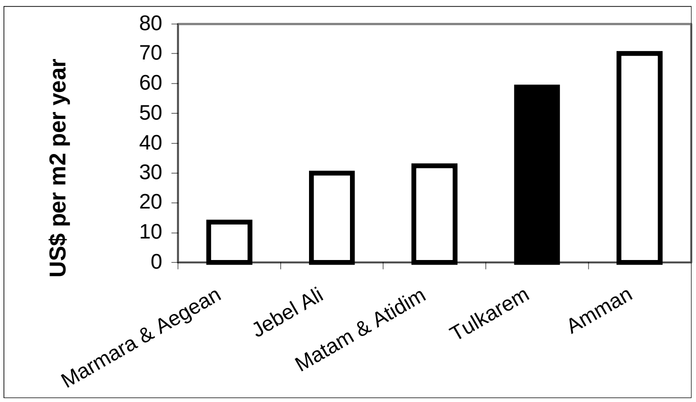
Figure 7.6b
Average Lease Rates for Standard Factory Buildings



[1] In Amman, standard factory building lease rates are those on offer at Sahab Industrial Estate, outside Amman, while office lease rates are based on average rates in central Amman.

In Tulkarem, office lease rates average US$59 per square meter per annum, significantly higher than average lease rates in all the other locations, with the exception of Amman. In Israel's technology parks, lease rates range from US$20 to US$45 per square meter per annum; in Jebel Ali, office space rents for US$30 per square meter per year; in Marmara and Aegean parks, the average lease rate is US$13.50 per square meter per year. Only in central Amman are lease rate higher than Tulkarem, where average annual rental rates are US$70 per square meter.

Figure 7.6c
Average Lease Rates for Office Space



Implications for Technology-based Industries

The prospect of high cost of land and building leases in the KTDC, based on existing rates in the Tulkarem region, can discourage investment, particularly from small, local investors. In order to maximize potential investment into the KTDC, land and buildings will need to be more competitively priced, in line with alternative locations in the region.

Because the KTDC site is owned by the Palestinian Authority, room exists to transfer land for development below market value. This pricing strategy can lower overall development costs and make the project more attractive to private developers. However, while this form of land subsidy will improve financial returns to the developer, such a subsidy represents a real opportunity cost to the Palestinian Authority that must be reflected in the project's economic cost/benefit analysis. This issue of KTDC land pricing is described in more detail in chapters 9 and 11.

7.6 Transportation

Because most foreign-owned operations and enterprises in developing economies are export-oriented and are also dependent on the import of capital equipment and raw materials, access to cheap and reliable transportation services can impact the ability of enterprises to meet their production requirements.

Since there are no sea or air ports in the West Bank, KTDC-based enterprises will have to rely on Israeli facilities to meet their import and export needs. The closest seaport to the KTDC is Haifa, and the closest airport is Ben Gurion, near Tel Aviv. Although Israeli transportation infrastructure at these ports is good and the Palestinians have access to it, delays as a result of Israeli security checks for products entering or exiting the West Bank are quite common.

Sea Transportation

While regular seaport handling and freight charges the same for both Palestinian and Israeli cargo, which are competitive with most other locations in the region (see Table 7.7a below), there is an extra $80-$120 charge for security inspections on all imports to and some exports from the West Bank. Additional warehousing fees are sometimes required due to delays. In addition, many Palestinian producers have suffered damage to their goods as a result of the security inspections.

Table 7.7a
Sea Transportation Costs (per 20' container)

	Sinai Technology Valley, Egypt	Khadoury TDC	Matam & Atidim, Israel	Jebel Ali, Dubai	Marmara & Aegean, Turkey	Amman, Jordan
Nearest Port	Port Said	**Port of Haifa**	Port of Haifa	Jebel Ali Port	Istanbul and Izmir Ports	Aqaba Port
Average port handling charges (US$)	65	**120 (30+80 for security inspection)**	30	110	75	95
Average sea freight rates (US$)						
New York	750	**1450**	1450	1750	1800	2500
Rotterdam	500	**400**	400	800	750	650

Air Transportation

Regular air freight charges are the same for both Palestinian and Israeli goods and are relatively high compared to most of the other locations under evaluation (see Table 7.7b). In addition, goods originating from the West Bank must exit Israel on cargo planes, as transportation on passenger planes, except for small packages, are not permitted due to security reasons. Consequently, both the cost of and the time required for air transport are closely related to the availability and destination of cargo planes. Re-routing, due to unavailable equipment or destination, usually results in higher than usual costs and longer duration of transport.

Table 7.7b
Air Transportation Costs (US$ per kilogram)

	Amman, Jordan	Jebel Ali, Dubai	Marmara & Aegean, Turkey	Khadoury TDC	Matam & Atidim, Israel	Sinai, Egypt
Nearest Airport	Queen Alia, Amman	Dubai Airport	Istanbul Intl., Izmir Intl. Airport	**Ben Gurion, Tel Aviv**	Ben Gurion, Tel Aviv	Cairo Airport
New York	1.50	1.70	1.95	**2.80**	2.80	3.00
Amsterdam	0.80	1.05	0.85	**1.50**	1.50	1.40

Implications for Technology-based Industries

The difficulties associated with the import and export of goods from the West Bank can strongly impact the attractiveness of the KTDC as an investment location for particular activities. The additional costs and delays may not discourage most technology-oriented enterprises, which tend to be less dependent on transportation than typical manufacturing enterprises. However, certain activities, such as some types of offshore data entry that require the frequent movement of goods, may find the KTDC a less attractive location from which to do business.

7.7 Investment Environment

Issues such as taxation, investment restrictions, import/export policies, and foreign exchange regime all form part of the “rules of the game” - the regulatory framework in which businesses operate. A “business-friendly” environment boosts business confidence and attracts investment. Although not sufficient by itself to attract investors, incentives can “sweeten the pot” if the fundamentals are in place.

The PA places a high priority on encouraging foreign investment in the West Bank and Gaza in order to promote growth, reduce unemployment, and support reconstruction efforts which began in 1994. The 1998 Law for the Encouragement of Investment guarantees the free transfer of all financial resources out of West Bank/Gaza, including capital, profits, dividends and gains. There are no restrictions governing foreign currency accounts or official currency transfer policies. The law also prohibits expropriation and nationalization of approved foreign investments, and provides free transfer of ownership.

The new law offers a broad range of investment incentives and tax exemptions. Tax exemptions are granted for 5 years, with reduced rates for additional years, the duration of which is determined by the value and/or nature of the project. The current corporate tax rate for West Bank/Gaza-based enterprises is 20 percent on net profits earned in the West Bank/Gaza, which is substantially lower than the corporate tax rates in the other locations under review (see Table 7.3 below). The fixed assets of the project are exempt from custom duties provided that they are brought in or imported within a set time frame. The spare parts, valuing up to 15 percent of capital and imported by the investing enterprise, are also exempt from customs duties.

Table 7.3
Investment Environment

	Khadoury TDC	Matam & Atidim, Israel	Marmara & Aegean, Turkey	Jebel Ali, Dubai	Amman, Jordan	Sinai, Egypt
Restrictions on Foreign Ownership	49% limit, though may be waived	For "Approved Enterprises", tax rate determined by foreign participation	Limited to 20% in broadcasting, and 49% in aviation and maritime transportation.	None	None	None
Minimum Capital Requirement	US$100,000 for tax incentives	None	$100,000 for industry; $50,000 for R&D projects	None	US$70,000	None
Corporate Tax Rate	20%	10-25% for "Approved Enterprises" ; 36% for others	30%	0% (no non-petroleum related project known to pay income taxes)	15-35%, depending on sector	32% on income derived from exports; 40% on all other
Tax Incentives	Exemption of 7 years and reduced rate of 10% for 8 to 20 years depending on the size and/or nature of investment	Exemption for 2 years	Aegean: 100% exemption Marmara: exemptions negotiable	Not applicable	Industrial Estates: 2-yr exemption for manufacturing Outside: 25-75% reduction for 10 years; none for services	Exemption up to 20 years Free land and infrastructure
Duty-free Privileges	Fixed assets and spare parts	None	Aegean: All goods	All goods	Fixed assets and spare parts	Fixed assets and raw materials
Incentives for R&D Projects	None	Grants up to 66% of approved expenditures; tax deductions	Government reimburse-ments up to 50% of investment	None	None	Government funded projects
Repatriation of Profits and Capital	Unrestricted	Unrestricted	Unrestricted	Unrestricted	Unrestricted	Unrestricted
Foreign Exchange Control	Exempt	Exempt	Exempt	Exempt	Exempt	Exempt

In addition, investors in the KTDC, which falls under the purview of PIEFZA, will benefit from a favorable package of incentives, as provided under the law, as well as additional benefits which are provided for in a Memorandum of Understanding between PIEFZA and the Ministry of Finance, including:

- Any income generated by projects in the free or industrial zones will enjoy a seven year tax holiday (versus five years for those investments located outside one of the estates), with partial exemptions thereafter, as follows:

    - Any investment project with a paid-up capital between US$100,000 and US$1,000,000 is taxed at a rate of 10 percent on net profits for eight additional years;

    - Any investment project with a paid-up capital between US$1,000,000 and US$5,000,000 is taxed at a rate of 10 percent on net profits for 12 additional years;

    - Any investment project with a paid-up capital exceeding US$5,000,000 is taxed at a rate of 10 percent on net profits for 16 additional years; and

    - Any investment project deemed to be “special”, either by its nature or value, is taxed at a rate of 10 percent on net profits for 20 additional years.

- Projects that source 60 percent of their components from the local market can benefit from an additional three year tax exemption.

- All exemptions may be extended by up to five years based on economic or export performance.

- In addition, "special" incentives may be granted to local investors.

However, unlike most of the other locations, including Israel and Turkey, the existing package of incentives for the KTDC does not actively encourage technology-related industries through the provision of special exemptions or other incentives for research and development. However, as demonstrated in Table 7.3, the KTDC can provide an investment environment that is relatively competitive with the other locations, with lower corporate tax rates and longer tax holidays than most of the locations, with the exception of Turkey and Dubai.

Implications for Technology-based Industries

Currently, the investment environment for technology-based industries in the KTDC is the same as for other industries locating in the Gaza Industrial Estate or in any other industrial estates in the future. While this package is relatively attractive, the provision of additional incentives for technology-oriented industries – such as tax credits, deductions, additional exemptions, or cash grants – could provide an additional boost to such industries, which typically face a higher degree of risk than non-technology related industries. This issue is discussed in more detail in chapter 9 of this report.

7.8 Implications for Technology-Oriented Development

The foregoing sections, through a comparative analysis, focused on a number of factors that generally shape the site selection decisions of investors in technology-related industries. The result is a clear picture of the KTDC's advantages and disadvantages as a potential investment center for technology-oriented enterprises.

The KTDC possesses several characteristics that make it a particularly attractive site for potential investors in technology-related industries:

- The KTDC is strategically located in northern West Bank, on the Green Line. Its proximity to the booming Tel Aviv-Herzlya-Haifa technology corridor will enable the KTDC to take advantage of Israel's US$6 billion hi-tech industry and the business potential that already exists.

- The KTDC can provide an investment environment that is competitive with the other locations, with lower corporate tax rates and longer tax holidays than most alternative investment locations in the region.

- The specific activities that will be attracted to the KTDC will be largely determined by the availability of required human resources. While locations such as Israel are experiencing severe labor shortages, particular for software programmers and technicians, the KTDC's access to the growing supply of relatively low-cost, qualified labor in the West Bank provides it with the opportunity to meet such manpower gaps, though it must compete with alternative locations in Jordan and Egypt where labor costs are substantially lower.

However, the difficulties associated with the import and export of goods from the West Bank can strongly impact the attractiveness of the KTDC as an investment location for particular activities. The additional costs and delays may not discourage most technology-oriented enterprises, which tend to be less dependent on transportation than typical manufacturing enterprises. However, certain activities, such as some types of offshore data entry that require the frequent movement of goods, may find the KTDC a less attractive location from which to do business.

There are several issues that can be addressed in order to boost the KTDC's attractiveness for technology-oriented investment:

- The KTDC can play a direct role in upgrading its human resource base by developing on-site training facilities and programs oriented toward industry needs. Specific recommendations regarding on-site training opportunities are provided chapter 9 of this report.

- The cost and quality of utilities on offer at the KTDC, particularly electricity and telecommunications, will have to be significantly improved if it is to maximize its potential to attract technology-oriented investment.

- In terms of telecommunications, an on-site teleport at the KTDC, providing export-oriented services, would be essential to ensure the required access to high-quality data and voice communications.

- The prospect of high cost of land and building leases in the KTDC can discourage investment, particularly from small, local investors. In order to maximize potential investment into the KTDC, land and buildings will need to be more competitively priced, in line with alternative locations in the region.

- The provision of additional incentives for technology-oriented industries – such as tax credits, deductions, additional exemptions, or cash grants – could provide an additional boost to such industries, which typically face a higher degree of risk than non-technology related industries. This issue is discussed in more detail in chapter 9 of this report.

8. Potential Demand for the KTDC

8.1 Introduction

Potential Investment Sectors

The KTDC, given its existing human resource and locational attributes as outlined in the chapter 7, can provide a conducive environment for the development of technology-oriented industries. The TSG team started with a broad base of technology-related industries to examine for their potential for investment into the KTDC. The initial list of technology sectors that have been selected for analysis are the result of several factors, including:

- Discussions with representatives from technology-oriented industries in both the West Bank and Israel;
- Current industry activity, identifying those activities that display an upward growth trend in West Bank/Gaza and/or Israel, recent inward investment activity, and/or possible industrial linkages with West Bank/Gaza- or Israel-based industries; and
- International investment trends in similar technology parks and TDC projects around the world and within the region.

The list was further validated by discussions with local industries for expansion into horizontal and vertical linkages to other industries. Private sector, industry-specific input has provided the necessary insight in factors that most significantly contribute to location decision making, both in general and within a technology park environment. This has allowed the team to determine industries for which the KTDC appears to be a promising investment location.

Following is a brief overview of the industry sectors selected for further analysis:

- **Software Development.** The Software Development sector was selected based on the growing number of computer science graduates from Palestinian universities and the increasing presence of computer-related enterprises in West Bank/Gaza, which grew from 25 establishments in 1994 to 62 in 1997, with the majority (41) located in the West Bank. Furthermore, the Tulkarem site is located in close proximity to the booming Tel Aviv-Haifa IT-corridor across the Green Line, a dynamic environment with potential spill over effects for the KTDC and West Bank/Gaza, which is evidenced by recent investments into the territory by several Israel-based companies. In general, the information technology sector has proved to be a successful industry for technology park and TDC project promotion in other locations, both in the region and beyond, including Israel, Turkey, Thailand, and India.

- **Electronics and Electrical Appliances.** The selection of the Electronics and Electrical Appliances sector was based on a number of key factors, including local industry presence, the availability of human resources, and potential for import substitution on a regional basis. Between 1994 and 1997, the number of local establishments engaged in this sector grew from 321 to 408, while the number of qualified graduates, including both engineers and technicians continues to expand. Furthermore, while the Middle East region is currently a net importer of these products, recent investments by multinationals in the region indicate the potential for establishing "point-of-sale" production facilities to serve the Middle East market.

- **Data Conversion.** The Data Conversion sector was selected based on several key factors, including the growing potential in the region, particularly Israel, for outsourcing back office activities to third party service providers – a trend that is widespread in the United States and Europe. In addition, this sector has figured prominently in the growth of many technology parks in developing countries, including Barbados, Mauritius, and India. While this sector is in its nascent stages in the Palestinian Territories, there is evidence of growing demand by Arabic speakers in both West Bank/Gaza and Israel for both basic data entry and digitization, as well as vectorization, services.

- **Call Centers.** The Call Center sector - which includes inbound/outbound telemarketing, answering services, and help desk services – was selected based on three key factors. There is growing demand in the region, particularly in Israel, for such activities, either through specialized "in-house" facilities or outsourcing to a third party service provider. In addition, this sector has figured prominently in the growth of many technology parks and/or corridors in both developing and developed countries, including Jamaica, Ireland, India, and many regions of the U.S. While this sector is virtually non-existent in the Palestinian Territories at present, there is growing demand in Arab-speaking regions throughout the Middle East.

- **Education and Training.** The selection of the Education and Training sector was based on the human resource requirements of the other sectors identified above – such as software language and information systems certification, English and Hebrew language training, and management and business training – and the inability of the existing education and training infrastructure to meet the growing demand. The KTDC can provide support to its tenants through the provision of on-site education and training opportunities, through both public and private participation.

8.2 Software Development and IT Services

The software development industry covers an extraordinary variety of sub-sectors and niche categories, which would be far too numerous to list in this present study. In the simplest terms, each niche category can be defined by three factors:

- *Point in the Production Process*. Like many industries, software development can be broken down into smaller, more discrete activities which make up the production process, including specification and prototyping, design, coding, testing, maintenance, and customization/conversion.[1] A specific software enterprise may carry out all or most of the above activities itself, or may outsource portions of the development process to companies that specialize in a specific activity, such as coding or product testing.

- *Type of Information System*. Software products are basically information systems, designed for use in a variety of fashions, such as:

  - operating systems (Windows, Linux) or data base management systems (Access);
  - communications software (voice and data networks);
  - computer-aided software engineering (CASE) tools;
  - animation, multimedia production;
  - business and consumer applications (office suites, management systems, e-mail, entertainment, etc.);
  - weapons systems; and
  - integrated software components for electronics.

[1] The specific activities are defined as follows:
- product specification and prototyping is the identification of user needs and product requirements;
- product design to specifications;
- program coding is the actual construction of the software product based on the design and specifications;
- product testing ensures that the product meets the desired specifications and identifies errors;
- product maintenance is the correction of errors following product delivery and changes in specifications, which can make up the highest proportion of software development costs
- product customization/conversion is the adaptation/re-coding of an existing software product to meet specific needs (language, market, platform, etc.)

- *Method of Supply*. Software can be supplied in three different forms: as a packaged product, as a customized product designed for specific clients, or as part of turnkey[2] solutions for specific clients.

The IT services sub-sector comprises a variety of other activities, including enterprise resource planning, network design and installation, web design, e-commerce, call centers, and remote office services. The last two sectors are evaluated in separate sections of this chapter.

The following analysis will identify the specific production activities, types of information systems, and methods of supply, as well as the range of IT services, that are appropriate for the KTDC environment, in order to assess the most promising sources of that investment.

Industry Demand Profile

The following section matches the factor requirements for the software development and IT services industries with the KTDC environment. As demonstrated in Tables 8.1 and 8.2 below, the KTDC will provide a promising location for investment by the software development and IT services industries. A KTDC-based teleport can ensure the availability of low-cost, high-quality telecommunications, a critical element for industries "without borders", but dependent on virtual transportation for its success. The KTDC's connection to the Israeli power grid, which will be required to meet the demand for electricity within any large-scale development in Tulkarem, will provide the required supply of reliable electricity to KTDC tenants.

Access to Capital

In terms of access to venture capital – often the lifeblood of fledgling software houses[3] – some funding is available through the Peres Center's Peace Technology Fund for Israeli-Palestinian joint ventures. The Fund provides qualified projects with up to 15

[2] Turnkey solutions are the provision of integrated hardware and software systems designed for the needs of a specific client.
[3] According to KPMG's *The Competitive Alternatives*, the average software company requires 67% of project costs to be funded through equity financing.

Table 8.1 Demand Profile for Software Development

Factor	Software Specification	Software Design	Coding	Testing	Maintenance	Conversion	Khadoury TDC
Labor Availability	Experienced systems analysts	Experienced software engineers	Programmers with training/ language certification	Experienced software engineers	Programmers with training/ language certification	Programmers with training/ language certification	Growing supply of computer science graduates, but need access to certification programs. Few with higher levels of expertise (engineers and systems analysts).
Labor Costs	Not as important as skills	Not as important as skills	Need to be cost competitive	Not as important as skills	Need to be cost competitive	Need to be cost competitive	Relatively cost competitive vis-à-vis other Middle East locations, but higher than other locations
Transportation	Not very important	Not very important	Not very important	Not very important	Not very important	Not very important	-------
Power Infrastructure and Costs	Reliable, relatively low-cost power supply required	Reliable, relatively low-cost power supply required	Reliable, relatively low-cost power supply required	Reliable, relatively low-cost power supply required	Reliable, relatively low-cost power supply required	Reliable, relatively low-cost power supply required	Possible to provide reliable power supply, but at higher cost than other locations in region
Water Infrastructure and Costs	Not very important	Not very important	Not very important	Not very important	Not very important	Not very important	-------

Factor	Software Specification	Software Design	Coding	Testing	Maintenance	Conversion	Khadoury TDC
Telecoms Infrastructure and Costs	Need for low-cost, high-quality telecoms, including high-speed access	Need for low-cost, high-quality telecoms, including high-speed access	Need for low-cost, high-quality telecoms, including high-speed access	Need for low-cost, high-quality telecoms, including high-speed access	Need for low-cost, high-quality telecoms, including high-speed access	Need for low-cost, high-quality telecoms, including high-speed access	Possible to provide low-cost, high-quality service through on-site teleport
Technical Support Services	Repair and maintenance for hardware	Repair and maintenance for hardware	Repair and maintenance for hardware; quality assurance/testing	Repair and maintenance for hardware	Repair and maintenance for hardware	Repair and maintenance for hardware	Relative supply of trained technicians in region
Financial Support	Often need for venture capital funding	Often need for venture capital funding	Often need for venture capital funding	Often need for venture capital funding	Often need for venture capital funding	Often need for venture capital funding	Some VC funding available

Table 8.2 Demand Profile for IT Services

Factor	Enterprise Resource Planning	Network Design & Installations	Web Design	E-Commerce	Khadoury TDC
Labor Availability	Experienced software programmers and trained computer technicians	Trained computer technicians	Trained computer technicians and programmers.	Trained computer technicians and programmers.	Growing supply of programmers, but need access to certification programs. Limited supply of trained technicians.
Labor Costs	Not as important as skills	Not as important as skills	Not as important as skills	Not as important as skills	Relatively cost competitive vis-à-vis other Middle East locations, but higher than other locations
Transportation	Not very important	Not very important	Not very important	Not very important	-------
Power Infrastructure and Costs	Reliable, relatively low-cost power supply required	Reliable, relatively low-cost power supply required	Reliable, relatively low-cost power supply required	Reliable, relatively low-cost power supply required	Possible to provide reliable power supply, but at higher cost than other locations in region
Water Infrastructure and Costs	Not very important	Not very important	Not very important	Not very important	-------
Telecoms Infrastructure and Costs	Need for low-cost, high-quality telecoms, including high-speed access	Need for low-cost, high-quality telecoms, including high-speed access	Need for low-cost, high-quality telecoms, including high-speed access	Need for low-cost, high-quality telecoms, including high-speed access	Possible to provide low-cost, high-quality service through on-site teleport
Technical Support Services	Repair and maintenance for hardware	Repair and maintenance for hardware	Repair and maintenance for hardware	Repair and maintenance for hardware	Relative supply of trained technicians in region
Financial Support	Some start-up capital required	Some start-up capital required	Some start-up capital required	Some start-up capital required	Some VC funding available

percent of the investment. To date, the Fund has raised more than US$65 million from the private-sector and hopes to have US$100 million available by the end of 1999. To date, US$13 million has been distributed to fund new projects in West Bank/Gaza. A number of other venture capital providers in Israel, including Leon Sfard of the Jerusalem Software Incubator, indicated a willingness to provide funding to promising ventures in West Bank/Gaza. Another potential source of venture capital or traditional investment is the Palestinian diaspora – similar to the role played by the Jewish diaspora in Israel - as many of its members have achieved
financial success in their new residencies and may be willing to aid start-ups “back home”.

Human Resources

The most important factor for investment in the software development industry – in terms of what types of products can be produced in a given location - is the availability and cost of qualified labor. The type of labor required is primarily determined by the point(s) in the software production process that will be taking place within a given location. Table 8.x displays the skills required at each step of the production process. Developing countries typically find it difficult to compete in those activities requiring higher levels of expertise – such as product specification and design – due to the lack of qualified and experienced engineers, circumstances shared in large part by West Bank/Gaza.

Throughout the course of this study, TSG consulted numerous, individuals, organizations, and other studies were consulted regarding the quality of software development skills in West Bank/Gaza – including local Palestinian software houses, foreign investors familiar with Palestinian computer science graduates, and the computer science departments of local universities. TSG findings indicate that there is overwhelming consensus that there are few “engineer”-level software professionals in the region (*i.e.* those with the ability to design new software versus programming new software), with the exception of returning expatriates who gained training and experience in more developed markets, particularly the United States.

In terms of local programmers, there is a growing number of computer science students graduating from Palestinian universities. While only 162 computer science students graduated in 1997, there are now more than 1600 students enrolled in computer science programs. These graduates possess a strong base at the theoretical level, but lack practical training and access to language certification programs. While many firms are willing to provide the necessary training, access to certification programs will be required to assure a supply of programmers that can meet international standards. Such access can be provided by the park itself through the provision of park-based education and training facilities (please see section on "Education and Training" later in this chapter as well as chapter 9).

Therefore, at least in the initial stages of development, it can be expected that any investment would mostly likely be in software development activities requiring a lower degree of expertise, such as coding, customization and conversion, testing, and maintenance of software, with little investment in other activities within the software production process. However, over time, as the skills and experience of local programmers progress, the potential for investment in design-related activities will increase.

In terms of labor costs, as demonstrated in the previous chapter, software programmers in West Bank/Gaza tend to be much cheaper than their Israeli counterparts (who are three to four times more expensive), and are relatively competitive with many locations in the Middle East, making it a favorable destination for investment. However, the cost of labor is considerably higher than India, one of the world's fasted growing locations for offshore software programming. Since labor costs typically account for approximately 80 percent of the operating costs for a software house,[4] the KTDC is more likely to attract investment in programming activities that require skills that are competitively priced or unique to the region, based on its proximity to the Israeli and Arab-speaking markets.

In terms of the selected IT services – web design, e-commerce, enterprise resource planning, and network design and installations – one of the most important factors for investment, as in the software sector, is access to the required manpower, including both trained programmers and technicians. As already discussed above, there is a growing pool of qualified programmers. The pool of qualified technicians is, however, far smaller. In 1997, there were only 343 students enrolled in relevant programs in West Bank/Gaza's technical colleges, which graduated a mere 51

[4] KPMG, *The Competitive Alternatives*.

students in 1997. This small supply of required labor is likely to limit investment in these activities. In addition, while there is some potential to export such services, a survey of the some of the largest markets (outside the U.S.) for such services indicates that few of these services are provided across borders, with the majority of domestic demand supplied by local companies.[5] Therefore, investment is likely to be further restricted by the small domestic market in West Bank/Gaza, which is less likely to attract foreign investment. Instead, it can be expected that any investment would more likely originate from local companies.

Potential Sources of Investment

The following sections evaluate the potential for sources of investment in software development and IT services for the KTDC. For each potential source, a broad overview of the industry structure is provided, followed by specific industry trends that are likely to impact interest in the KTDC. The last section summarizes the specific market niches that are likely to attract the greatest degree of investment from each potential source and their expected growth over time.

Arab Middle East

A growing regional market. The regional, Arabic software market has demonstrated considerable growth over the past few years, reaching approximately US$1.2 billion in software sales. In terms of software development, however, the Arabic market remains shallow. With the exception of a few large companies that export to the region, the industry is comprised of mostly small companies oriented toward their domestic markets, producing customized software applications for local businesses and government agencies. Imports of software, mostly from the United States and Europe, dominate local sales. Virtually all systems software and the majority of packaged applications are imported. For instance, Saudi Arabia’s market for consumer and business applications totaled US$419 million in 1998; local production only accounts for US$21 million, with imports (mostly from the U.S. and Europe) accounting for the remainder.

Regional niche categories. As all systems software is imported from the leading multinationals (Microsoft, Novell, Unix), regional software production is oriented toward applications software and

[5] U.S. Department of Commerce *Best Market Report for Computer/IT Software/Services*, October 1998. Markets covered for IT services included Australia, Belgium, Germany, Italy, Netherlands, South Africa, Sweden, Thailand, and Vietnam.

Arabization of other software. While Egypt produces the widest range of software (see discussion below) – from business applications to Internet software to Arabic language word processors - the leading categories for development in the remainder of the Middle East are packaged and customized business applications for banking and finance, health and medical, education, database management, and other Arabized consumer and business applications.

Few investment opportunities, but many market opportunities. Few regional producers have either the capacity or marketing skills to become more outward looking, either in terms of exports or outward investment. However, the few "big" names in the Middle East, such as the Kuwaiti-owned Sakhr, may be potential targets for investment in the KTDC. The Arab-speaking markets of the Middle East provide, instead, a growing consumer market for software, including both Arabized packaged software and customized business applications.

The Egyptian market demonstrates scope for development. Egypt has the largest software sector among the Arabic-speaking markets and provides an indication of the scope for development of a regionally-oriented software industry in the Middle East. Egypt boasts more than 200 indigenous software companies, which employ 25,000 people, including 6,000 software professionals. In 1997, local production was valued at US$25 million. Locally developed application packages, which are destined for the domestic and regional markets, account for approximately 42 percent of production, while Arabized versions of existing applications account for more than 22 percent of local production; the remainder of local production is comprised of turnkey projects, primarily for the local market. While Sakhr Software, IBM, and few other large companies produce a wide spectrum of software applications (including Arabic word processing applications, spell checkers, Internet software), the remainder of the market is oriented toward the production of business applications, including banking and finance, health and medical, education, and database management – leading sectors for the regional market.

The KTDC would provide a favorable location for software developers - from Israel, West Bank/Gaza, the United States, or Europe – to access the growing Arabic-speaking markets of the Middle East. The Egyptian market, as described above, provides a good indication of the most promising industry sectors, including Arabized packaged software and business applications, particularly financial management, accounting and other data base systems.

Israel

A large and booming sector. The software development industry is one of Israel's largest and fasted growing sectors, valued at US$1.2 billion in 1998, with exports totaling more than US$700 million (compared to US$5 million in exports in 1984). The domestic market, in terms of consumption, totaled US$1.2 billion in 1998, for which imports, mostly from the U.S., accounted for US$750 million. In addition, many electronics companies in Israel, as in the rest of the world, meet a large proportion of the software needs "in house", data which is not fully captured in market and trade statistics. Trade with the Middle East region accounts for only a minimal fraction of Israel's software exports and virtually none of its imports, with the largest share of trade taking place with Egypt, Jordan, and West Bank/Gaza.

A diversified domestic market. Today, there are approximately 500 software houses in Israel, including more than 200 start-up companies, most of which are located in Tel Aviv-Haifa corridor, in close proximity to the KTDC. The number of electronics and communications companies that conduct their own software development "in house", though undocumented, would boost these numbers even further. While the United States largely dominates the development of systems software, the Israeli software sector is present in virtually every other sub-sector of the industry, from internet-based software to consumer and business applications to defense systems, from packages to custom and turnkey systems. The software sector has attracted inward investment from leading multinational software and electronics companies, particularly from the U.S., as well as Europe and East Asia, including greenfield investments, joint ventures, and acquisitions of Israeli companies. A shortlist of multinationals designing and developing software in Israel includes Microsoft, AOL, IBM, Motorola, Intel, Cisco, EDS, Siemens, and Hewlett Packard.

Israel's growing shortage of software programmers and engineers prompts outward FDI. Today, Israel has more than 10,000 employed in the software industry and demand for qualified software engineers and programmers continues to grow, far out-pacing the current supply. The end result is a more than 2,500-

strong manpower gap, with software engineers and programmers accounting for the largest share (42 percent).[6] Given the local complexities involved in importing the required labor, Israeli companies are beginning to turn to offshore investment and outsourcing to meet its manpower needs, though many are concerned about compromising "company secrets". In the past two years, Israeli companies and Israel-based multinationals have entered into several joint ventures in the region, including two in Jordan and three in the West Bank, in order to meet the shortfall in demand:

- MLL has entered into a consortium of two Israeli companies, three international companies (including BAN of the Netherlands) and one Jordanian company, Horizon Software Technologies. The project currently employs ten people, but will ultimately employ 50 employees. The project will compete with other BAN subsidiaries for products destined to the global market.

- In Jordan, the Israeli company Malam Systems invested US$2 million in a joint venture with Jordan's Century Investment Group. The joint venture will eventually employ up to 200 programmers and will act as a sub-contractor to Malam in Israel, producing Y2K solutions.

- Siemens Data Communications in Israel, together with Siemens Germany, has entered into a joint venture with Hi-Tek in Ramallah. Siemens is currently training 10 local graduates in their offices in Karmiel. These first trainees will remain in Karmiel for one year and then will return to the West Bank and train up to 20 other Palestinians. The joint venture will concentrate on local area networks, one of the principal activities of Siemens Data Communications.

- Hewlett Packard Israel is entering into a partnership with Safad Engineering in Ramallah. The company will conduct software testing and enterprise resource planning (ERP).

[6] The S. Neaman Institute of the Israel Institute of Technology, Technion, *The Shortage of Electronics Engineers and Computer Sciences Graduates in Companies Incorporated in the Electronics Industries Association*, 1997. The total manpower gap for software development (in both electronics and software companies) is estimated at 2,500. The demand for software programmers and engineers accounts for 42 percent of the gap, while the demand for network specialists and systems analysts account for approximately 19 percent. Support and communications specialists account for another 19 percent.

- Lernout & Hauspie, a Belgian company specializing in speech recognition software, will be investing US$10 million over the next 3 to 5 years in West Bank/Gaza.

In addition, TSG findings, which are based on company surveys with several Israel-based companies (see relevant surveys in Annex A), indicates a strong interest in investing in West Bank/Gaza. While some companies noted the concerns of many Israelis, in terms of security, about doing business across the Green Line, the KTDC's strategic location can mitigate such concerns, providing a "safe haven" for Israelis operating in West Bank/Gaza. In addition, its close proximity to Israel's hi-tech corridor ensures that Israeli managers have easy access to their "foreign" operations. Many have also noted the benefits of partnering with or hiring Palestinian programmers, particularly the strong social and family ties that lessen the probability that once a worker is trained, he or she will seek employment in other markets. The KTDC can provide an opportunity for Israel's software industry to meet part of its manpower needs, through joint ventures and/or sub-contracting arrangements with Palestinian firms.

Accessing the regional market. While the regional, Arab-speaking market has until now not been accessed, for the most part, by Israel-based companies, the total market is equivalent to Israel's domestic market, which absorbs almost half of the industry's output – a relatively sizable market for Israel's software producers. While ongoing trade embargoes limit Israel's ability to penetrate the Arab markets, Arabized Israeli software products with a "Made in West Bank/Gaza" label could provide such access.

Promising Niche Sectors. Based on the above analysis and the Palestinian experience to date (see discussion on Palestinian market below), the following niche sectors present the most promising opportunities for partnerships between Israeli and Palestinian software developers:

- Programming (coding, testing, conversion, and maintenance) for packaged software, including consumer and business applications (multimedia, Internet, etc.), and database management systems (particularly financial/banking and medical/health systems).

- Arabic language components (coding, testing, conversion, and maintenance) of bi- or multi-lingual software applications, including CASE programs, database management systems (particularly financial/banking and medical/health systems), and consumer and business applications (particularly Internet-related software, banking/financial applications, education, entertainment/multimedia) – some of the leading segments of the regional software market.

International

U.S. dominates global market. The United States dominates worldwide production of software, particularly the packaged software segment. In 1998, U.S. production of packaged software reached approximately US$97.5 billion, or 75 percent of the global market for this segment. Europe trails behind, with 15 percent of global market share in packaged software, while Japan accounts for 5 percent. All other countries, together, account for the remaining 5 percent.

Growing interest in serving Arabic-speaking markets. While English remains the global *lingua franca* of the IT industry, demand or bi- and multi-lingual applications is growing, including both foreign-language interfaces and multi-lingual translation programs. The widespread use of the Internet has provided an additional boost to the latter. While Western-language interfaces are widely available, non-Western- language interfaces, such as Arabic, continue to be in relatively short supply, despite recent efforts to satisfy this growing market. Over the past few years, a number of software houses have introduced Arabic language-based applications to supply the 186 million strong market of native Arabic speakers.

- One company in particular, the Kuwaiti Sakhr Software, has been very successful in marketing its Arabic-based applications, including web browsers and English-Arabic e-mail readers.

- IBM established in 1984 an Arabic Competence Center in Cairo, which develops tailor-made applications that support Arabic.

- Other companies including such multinationals as Microsoft, Borland International, Oracle, Apple, and Digital Equipment

Corporation have introduced Arabic versions of their latest software products.

The KTDC, with its relatively low-cost supply of programmers in the region, would be an attractive base from which software developers could access this growing niche market, either through partnerships or sub-contracting arrangements.

Labor shortages translate into outsourcing opportunities. The leading markets for software development are currently facing extremely tight labor markets for trained programmers. In the U.S., it is estimated that there is a shortage of 350,000 programmers, systems analysts and computer scientists. While labor demand is growing, the growth of the labor supply cannot keep up and, in absolute terms, is actually in decline: the number of computer science graduates in the U.S. declined from about 42,000 in 1986 to below 24,500 in 1995. Canada presently has a shortage of 20,000 programmers. The UK, another leading supplier of software development, is facing similar shortages in trained computer programmers. Even less developed, but growing, markets, such as Singapore and Thailand, are also experiencing labor shortages in their software development industries.

Not only have these labor shortages already led to skyrocketing salaries in these markets, but they may also lead to a potential loss of competitiveness in these markets as key positions go unfilled. Consequently, software developers are increasingly looking to overseas markets to meet their growing demand for lower cost, but highly qualified, labor. Nearly 200,000 jobs have already been “exported” to India by American software developers. Ireland and Bulgaria have also benefited from this trend. West Bank/Gaza and the KTDC, with its reputation for quality programmers and competitive labor costs within the region, can exploit the growing shortage, particularly for specific niche markets, where its cost disadvantage vis-à-vis locations such as India would be less important than skills specific to the region (*e.g.* Arabized software).

Recent investments point to potential interest. Recent investments by multinationals point to the potential interest in tapping into West Bank/Gaza’s supply of qualified programmers:

- Timex is currently training 10 to 12 recent computer science graduates at one of their production sites in the Philippines. Once training is completed, a software center will be established in El Ram in October 1999 and will operate as a wholly-owned subsidiary of Timex. Initially, production will focus on global positioning software, but will also develop new products in the future. Eventually, depending on funding, Timex would like to expand its employment to 25.

- IDS, a Silicon Valley-based software developer, has recently established a subsidiary in Ramallah, which specializes in web-based interactive database software. The subsidiary will develop and program products in English for export to world markets. IDS West Bank/Gaza currently employs 16 programmers, some of which have been trained in the United States.

The KTDC, by providing a favorable environment for investment, can build on the slow but growing trend of multinationals to locate in the region, both to meet their manpower needs and their interest in the regional market.

The lack of adequate intellectual property protections can deter investment. One important factor that can negatively impact investment by software developers is the present lack of adequate intellectual property protections in West Bank/Gaza. It has been estimated that the United States, alone, has foregone US$11 billion in sales due to worldwide piracy in software business applications. While the Middle East only represents a small share, in absolute terms (US$250,000), the region has the highest rate of piracy in the world (69 percent in 1998).[7] While the PA is currently drafting new IPR legislation, it is important that the new laws meet international standards, conforming to both TRIPs and WIPO standards.

Promising Niche Sectors. The following niche sectors present the most promising opportunities for partnerships between multinational and Palestinian software developers, based on the above analysis and local industry experience:

---

[7] Includes only piracy of business application. From the *1998 Global Software Report* (May 1999), conducted by International Planning and Research Corporation for the Business Software Alliance and the Software & Information Industry Association.

- Programming (coding, testing, maintenance) for packaged software – mostly consumer/business applications (multimedia, Internet, etc.), database management systems (particularly financial/banking and medical/health systems), and other “non-sensitive” (*i.e.* Internet security, defense-related, etc.) niches.

- Based on regional demand, Arabic language components (coding, testing, maintenance) of bi- or multi-lingual software applications, including CASE programs, database management systems (particularly financial/banking and medical/health systems), and consumer and business applications (particularly Internet-related software, banking/financial applications, health/medical, education, entertainment/multimedia).

West Bank/Gaza and the Diaspora

A small but growing sector. The software development industry is currently in its nascent stages, though it has grown rapidly in the past few years (See figure 8.1). As of 1997, there were more than 60 computer-related companies, many of which, though not all, are engaged in software development and/or provision of IT services, including enterprise resource planning, network design and installations, web design and multimedia production. According to data obtained from the Central Bureau of Statistics, the majority of these companies employ less than 5 employees, which is relatively small by world standards. During the course of this study, 12 local computer-related companies were interviewed (see relevant surveys in Annex A). The majority of these companies were established by returning expatriates and employ graduates from local universities.

In addition, the majority of enterprises, which are based in Ramallah, are producing customized software, based on off-the-shelf data base management systems and business applications, for the newly established PA Ministries and other government agencies, as well as locally-based banks and financial institutions. A few companies have begun to export their services to similar institutions in the region, particularly in Saudi Arabia. Many of the companies interviewed pointed to their lack of experience, entrepreneurial skills and marketing skills as the key impediments to accessing export markets. While joint ventures or other

Figure 8.1
Growth of Computer and Related Activities in West Bank*

*Computer and Related Activities include, hardware and software consulting, data processing and other activities. Based on statistics from the 1998 *Establishments Report* from the Palestinian Central Bureau of Statistics.

partnerships with foreign companies could provide a solution in the short-term, many are hesitant about developing such "dependencies" in the long-run and, therefore, the development of local training programs - in both programming and marketing - will be required for the long-term development of the indigenous software development industry in West Bank/Gaza.

While the growing number of computer-science graduates will ensure a steady supply of software programmers in the future, the number of potential partners for foreign investors, as well as entrepreneurs is somewhat limited in the immediate-term, but will grow with time, as local developers gain the requisite experience.

Potential for investment by local and diaspora Palestinian entrepreneurs not in partnership with foreign companies may be somewhat limited in the initial stages of the TDC, but will likely grow in the medium- to long-term. Initially, most of their activities are likely to be a continuation of the industry's current activities – companies engaged in customized data base management systems (banking/financial, medical/health, government systems), business applications, and turnkey solutions for the PA and regional financial institutions. In the medium- to long-term, as local programmers and engineers gain experience, increased opportunities will emerge for local entrepreneurs to design and code Arabized software, outsourced from Israeli and international companies, as well as to design and develop new software for the regional market.

Demand for KTDC Facilities

The following presents the short- to long-term potential for the establishment of the software development industry at the KTDC. Software investment in the KTDC will likely begin with the establishment of Israeli-Palestinian joint ventures, as well as investment by large, local companies. With proper incentives and telecommunications infrastructure, the KTDC will have the potential to attract to multinationals interested in accessing the regional Arabic-speaking markets.

Short-term

In the short-term, most software development investment will come from Israel-based companies, including both software houses and electronics companies with “in house” software development needs, interested in accessing the lower-cost Palestinian labor market in order to meet manpower shortages in Israel. Investments are most likely to take the form of joint ventures and/or sub-contracting arrangements with Palestinian firms. Activities will initially focus on the level of existing software development skills, including programming and other coding of business and database management applications.

The KTDC also has the potential to attract Israel-based or multinational companies (both software houses and electronics companies with “in house” software development needs) interested in producing Arabized or other localized packaged software (primarily consumer and business applications and database management applications) for the regional market. There is also potential to attract the larger Arab regional players, with either significant exports to or outward investment within the region.

Once the first anchor tenants locate at the KTDC and based on the opportunities to be provided by a park-based incubator program, local and expatriate Palestinian entrepreneurs will also be attracted to the KTDC in the first phase of development. In the short-term, it is likely that their activities will be a continuation of the local industry’s existing activities: customized database management systems (banking/financial, medical/health, government administrative systems), business applications, and turnkey solutions for PA and regional financial institutions.

Medium- to long-term

In the medium- to long-term, it is expected that the composition of software development activities over time. While the potential sources of investment will remain the same, the activities and motivation for investment are likely to change, moving from the production of lower-technology products to higher-technology products. As the local skills base matures and gains the requisite expertise, opportunities will emerge for partnerships in more sophisticated activities, including software product design and engineering. In the longer run, as the KTDC becomes more integrated with the existing technology corridor across the Green Line, the KTDC is likely to attract the establishment of multinational regional headquarters.

Demand Forecast

Based on the above analysis, software development activities will grow gradually over time, averaging five to nine investments per year, two-thirds by Israeli/international investors and one-third by local and expatriate Palestinian entrepreneurs.

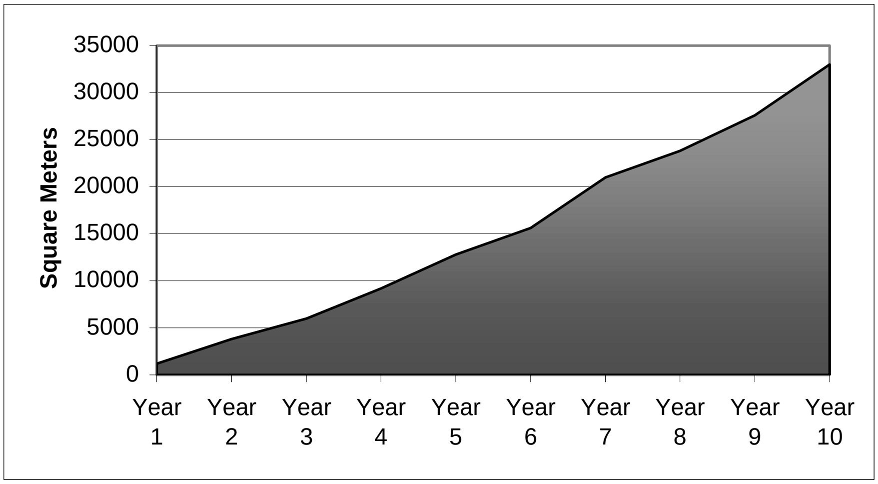
Table 8.3 below shows the expected average size of investments, in terms of employment, capital and space. Estimates for Israeli/International investments are based on recent investments by such companies into the West Bank and TSG surveys with other potential investors. For locally-sourced investments, investment size is based on existing and projected growth patterns of the local software development industry. For local firm, capital investment per employee is expected to be significantly lower than Israeli and international investments, as local investors are more likely to begin operations through either the incubator or shared office space facilities.

Table 8.3
Projected Investment per Software Development Project

Type of Investor	Employees	Investment (US$ ‘000)	Space
Israeli/International	30	400-600	600
Local/Expatriate	10	150-200	200

The following figure illustrates the predicted growth of software development activity in the KTDC.

Figure 8.2
Software Development Space Uptake



8.3 Call Centers

Call Centers are facilities that handle large volumes of incoming and outgoing calls for the purposes of sales, marketing, customer service, and technical support. Call Centers combine voice communication, data communication, data processing, E-mail, Internet ICQ, and in the future, video technology. Some companies operate their own call center operations, either in the home country of the firm, or overseas. However, the outsourcing of call center operations is a growing trend.

In 1998, worldwide revenues from the call center market totaled US$ 23 billion. This value will more than double to US$ 58.6 billion by 2003. Outsourced services comprised 74 percent of this market, or US$ 17 billion. By 2003, outsourced call center services are expected to reach US$ 42 billion in revenue.[8]

Many industries utilize call centers for a variety of activities. TSG analyzed the following three Call Center activities for this study.

- *Inbound Telemarketing and Reservations* include calls that a customer initiates. Companies provide toll-free numbers that are linked to either their own call facilities or those of a third-party that it outsources to handle services such as the following:

  - Hotel and airline reservations
  - Physician's appointments
  - Catalog sales
  - Ticket sales for performing arts events
  - Auction or promotional campaigns advertised in newspapers or on television[9]

  Telemarketing firms and call centers sometimes offer fulfillment services in addition to sales and marketing activities. These services, which follow up on the call to customers, include sending faxes, e-mails, invoices, small packages, and logging short reports related to the call.

---

[8] *Call Center Services, Worldwide Markets and Trends, 1998-2003.* Report by the International Data Corporation (IDC), 1999.

[9] Auctions are particularly popular in Israel. Customers place calls to toll-free numbers to bid on items that have been advertized in the newspaper. These auction campaigns are outsourced to call centers such as Telepower (See Annex for notes about the interview TSG conducted with Telepower.)

- *Outbound Telemarketing* refers to solicitation initiated by a company either through its own call facilities or a third-party outsourced call center. Outbound telemarketing involves calling existing or potential customers with information on new products or sales. Activities include:

  - Research surveys conducted over the telephone
  - Solicitations for charity
  - Sales for upgrades of telephone service or newspaper subscriptions
  - Development of databases of prospective customers
  - Credit card and insurance marketing[10]

  Telemarketing firms or call centers typically provide a mix of both inbound and outbound calling activities through the use of specially designed telephony software. As the number of inbound calls outweigh the outbound, a technique known as "call blending" is used to help increase the number of outbound calls. Call blending optimizes an agent's time by integrating inbound and outbound calls. When the agents do not receive calls, they make calls.

- *Help Desk and Customer Services* refer to activities that offer technical support, product information, or complaint assistance to customers. A company may either handle these services themselves, or outsource them to a third party firm.

  Such a call center would handle activities such as the following:

  - Technical support in installing newly purchased software[11]
  - Centralized help desk information for a company's technicians or mechanics[12]
  - Customer information about certain products[13]
  - Support services for Internet service providers

[10] Credit card and health insurance companies, for example, outsource marketing activities to the U.S.-based ICT Group.
[11] Kalanit-Carmon, for example, provides technical help desk support in Israel for Microsoft, Hewlett-Packard, Novell, and Oracle. They are certified and contracted by each of these companies to provide these services.
[12] The Minacs Group, for example, provides a technical help desk service for certified mechanics at General Motors's automobile dealerships.
[13] The Minacs Group, for example, staffs the customer service desk of Nestle Corporation.

- Electronic technical support services including e-mail and real-time chat responses to customer inquiries.

Technical support services are often included either as part of a product's warranty for a limited time or as a purchased support agreement or billed by the amount of time that the agent spends with a customer. Hewlett Packard, for example, provides technical assistance over the telephone free of charge for the lifetime of the product. Hewlett Packard outsources these help desk services, and reimburses the outsourcing company for these services.[14]

Industry Demand Profile

This section benchmarks the factor requirements for the Call Center industry with the KTDC environment. Table 8.4 on the next page compares the requirements for inbound and outbound telemarketing and help desk services with the physical infrastructure and human resources available at the KTDC.

Marketing and Technical Skills

Both technical and marketing skills are required for successful Call Center activities. If the outsourced service is of a technical nature, such as software or Internet support, then call center agents must have a prior background in computing, or receive this training as part of their company orientation. In the Call Center industry, more and more emphasis is being placed on talent for marketing and service positions.

Call centers are increasingly playing a consulting role, guiding clients on how to best market their products and services to the local market. Therefore, marketing and knowledge of international business are often necessary skills. The KTDC certainly offers a large pool of skilled workers with high school education or higher. This is the minimum necessary requirement for call center agents.

[14] In Israel and West Bank/Gaza, Kalanit-Carmon is the authorized technical help desk call center provider for Hewlett Packard. Safad Engineering is the authorized Hewlett Packard wholesaler, but does not yet provide authorized help desk services.

Table 8.4 Demand Profile for Call Center Industry

Factor	Inbound Telemarketing and Reservations	Outbound Telemarketing	Help Desk and Customer Services	Khadoury TDC
Labor	Multilingual employees with English-speaking ability. Minimum skills needed are high school reading and math ability.	Employees able to speak the languages and dialects of targeted markets.	Employees trained in the technical area served by the help desk service. Some multilingual ability is helpful.	Ample supply of computer technicians and computer-literate graduates. Some workers proficient in English and/or Hebrew. Workers may lack necessary marketing skills.
Labor Costs	Important. Firms locate or outsource to centers with moderately low labor costs.	Somewhat important. Fluency in language and culture of customer market is of greater importance.	Somewhat important. Fluency in language and culture of customer market is of greater importance.	Relatively cost competitive vis-à-vis other Middle Eastern countries, Europe, and North America, but higher than countries such as India.
Transportation	Usually not important.	Important if firm is engaged in fulfillment services such as small parcel delivery.	Usually not important.	Delays in importing and exporting, as well as added costs for security checks required by Israel.
Power Infrastructure and Costs	Requires uninterrupted supply of relatively inexpensive power.	Requires uninterrupted supply of relatively inexpensive power.	Requires uninterrupted supply of relatively inexpensive power.	Possible to provide reliable, relatively low-cost power supply.
Water Infrastructure and Costs	Not important.	Not important.	Not important.	Water supplied to the KTDC.
Telecoms Infrastructure and Costs	Very important. Deregulated telecom market is crucial.	Very important. Deregulated telecom market is crucial.	Very important. PalTel sufficient for servicing local market.	Possible to provide low-cost, high-quality service through on-site teleport.
Technical Support Services	Computer software and hardware technical support.	Computer software and hardware technical support.	Computer software and hardware technical support.	Ample supply of trained technicians in region.
Financial Support	Firm will not enter an unprofitable market without client base. Client provides the market and funding.	Funding necessary if customer base is not built up.	Firm will enter market with sufficient customer base. May seek outside funding sources.	Some VC funding available

Additionally, there are enough graduates from technical colleges and universities in northern West Bank who, with some training, would be able to fill positions in a computer hardware or software technical help desk. However, the northern West Bank area probably lacks enough workers with marketing skills and knowledge of international business practices to carry on the consulting and marketing activities of a large-scale call center firm.

Location

Several of the companies surveyed noted that it was helpful to locate a call center operation next to a college or university. This is a good source from which to draw well educated workers at lower salaries. For example, Decision One just opened a new customer support center in Bryan, Texas USA to take advantage of the well educated computer savvy population at nearby Texas A&M University.[15] Telepower is another example of a firm that is taking advantage of student call center agents. It will soon move its operations from Tel Aviv to the city of Beer Shiva, where it will take advantage of a greater supply of young workers at prices about 20 percent lower than Tel Aviv.[16]

Most call center clients desire the location of the call center to be near the markets that they serve. Location is less of a concern the greater the multilingual fluency of a market. West Bank/Gaza, for example, will not be a location from which U.S. companies route calls to serve markets in North America or Europe. On the other hand, it is possible that West Bank/Gaza could become a location from which to offer customer service and help desk services to Arabic-speaking markets in the Middle East.[17]

Telecommunications

Technology and telecommunications also drive the growth of Call Centers. The deregulation of telecommunications in Sweden in 1993, for example, fostered the growth of technical help desks and telesales operations that service Western Europe. Companies began to locate their call centers in Sweden in the

[15] PR Newswire. "DecisionOne and Bryan College Station Economic Development Corporation Partner to Build New Customer Support Center; New Facility to Support Growth of DecisionOne's End User Support Services." July 7, 1999.
[16] TSG research. See the Annex for complete notes about TSG's interview with Telepower.
[17] TSG research suggests that call centers in West Bank/Gaza would not be able to well serve markets in French/Arabic-speaking North Africa.

early 1990s because the rest of Europe has not deregulated its telecommunications markets.[18]

In the absence of additional large investments and deregulation of telecommunications, West Bank/Gaza will still attract some small home-grown technical help desks. However, large call center operations demand excellent and inexpensive telecommunications and sometimes satellite, or teleport, facilities. If West Bank/Gaza is serious about providing the incentives necessary to attract call centers that service the entire Middle East, a deregulated telecommunications market with teleport facilities is a necessity. If communications with a large Call Center are disrupted—even for an hour—it can seriously dent a firm's revenues as well as interrupt business.

A telephone company dedicated solely to the development of the information processing industry is needed in order to attract the type of call centers that would service the entire region. Jamaica did this for its Montego Bay call center facilities. They offer a flexible volume discount for call center companies. It would also be necessary for West Bank/Gaza to have toll free switched and dedicated lease lines to the Middle East markets served. That way, customers in Jeddah, Saudi Arabia, would dial a local number free of charge that would connect into the Palestinian call center. With excellent telecommunications, and call center agents fluent in local dialects, the caller would not know that he or she is talking to someone outside of Saudi Arabia. It is also very important to understand cultural differences among the customer base. Solutions must seem borderless so that a call placed in Kuwait, routed through London, and answered in Tulkarem seems like it is answered locally.

Cost of Labor

Table 8.5 below compares the beginning monthly wages of call center agents in the United Arab Emirates, Turkey, Ireland, Israel, and the United States. Although cost of labor is not the single defining determinant of call center location, it can play an important role when deciding among locations that are equal in other respects. West Bank/Gaza's low labor costs, vis-à-vis Israel, give the KTDC a significant cost advantage.

[18] C@LL CENTER Solutions. "The Two-Year Trend Toward Sweden in International Call Center Site Selection." April 1999.

Table 8.5 Beginning Call Center Wages[19]

Country	Call Center Salary
UAE (Dubai)	US$ 1,000 – 2,500/month (fully burdened)
Turkey	US$ 1,000/month (basic) US$ 1,400/month (fully burdened)
Ireland	US$ 1,140 – 2,355/month (basic)
Israel	US$ 1,100 – 1,600/month (basic) US$ 1,540 – 2,240/month (fully burdened)
United States	US$ 1,430 – 2,520/month (basic)

Facilities

A solid base of experienced clerical workers, supervisors, technicians, and computer programmers are needed for a call center operation. Since a lot of training is involved with Call Center operations, there needs to be a low level of turnover among employees. Therefore, working conditions should be clean and well organized for optimal communication between supervisors and Call Center agents, and ample facilities should be provided for employees to take breaks. Since Call Center activity becomes very active in the evening when consumers are home from work, providing safe working conditions for evening employees is very important.

Training

Call Center employees require training in both the technical competency of the client company, and in customer service relations. Typically, Call Center agents spend one to four weeks in training run and developed by the call center firm. On-the-job training typically ensues after that. Kalanit-Carmon, an Israeli IT help desk agency, for example, provides technical help desk services for Hewlett Packard and several computer software companies. Its help desk agents attend a three-week course at Kalanit-Carmon before they begin answering calls. Team leaders, or supervisors, are sent to Amsterdam, Holland for further training. As the help desk agents acquire technical skills, more complex calls are routed to them.

In addition to technical training, call center agents also require training in communication skills—conveying ideas, providing responses to customers, tone of voice, and use of emotions.

[19] Call center wages depend upon skill level and experience of workers. Customer service and telesales representatives, for example, earn less than Microsoft-certified technical help desk agents. The industry also relies heavily upon part-time workers, thus reducing the fully-burdened wage in the case of countries like the United States where employers may not be legally required to provide fringe benefits like health insurance.

They should learn questioning techniques, problem statements, and solution delivery. The KTDC provides a large pool of workers that can easily be trained on technical matters. Customer service and marketing training, therefore, will be very beneficial to any growth in this industry in the KTDC.

Potential Sources of Investment

This section describes where the worldwide growth is in the Call Center industry, and who the likely Call Center investors in the KTDC might be.

International

The United States leads the global call center industry. Eight of the top ten, and sixty-nine of the top one hundred IT companies are in the United States, according to Datamation Magazine's 1995 survey of technology companies.[20] Firms that have traditionally specialized in IT products, are now generating a higher percentage of revenues from IT services. Due to growing competition in the market, firms must find ways to differentiate themselves on a basis other than price. Therefore, they are looking to customer service to increase the overall value of their products.

The Call Center industry is a US$ 150 billion business per year. The bulk of the activity remains in the United States, Canada, Ireland, United Kingdom, Holland, and several other sites throughout Western Europe. Many of the major call centers are operated internally by major hotel, airline, financial, and information technology companies. The largest independent call center companies tend to be based in the United States, Canada, and Western Europe. The United States leads other world markets for call center services. In 1998, call centers in the United States accounted for 53 percent of the world market, or US$12.2 billion revenue.[21] Many North American call centers serve their clients' Middle Eastern and African customers through their European facilities. However, as the insurance, banking, credit card, and information services industries in the Middle East grow, the demand for telesales, customer service, and IT services such as technical help desks is increasing in that region.

[20] U.S. Industry and Trade Outlook 1998: Information Services
[21] "Opportunity Calls: IDC Expects Worldwide Call Center Service Revenues to More than Double to $58.6 Billion by 2003." International Data Corporation, June 9, 1999.

The decentralization of call center services favors expansion into Middle East markets. The trend toward call center decentralization indicates that call centers will be more likely to locate in the Middle East region in the future. U.S.-based Sitel, for example, partnered with Cupola in the United Arab Emirates to develop a 200-seat call center that began operations in March 1999. However, TSG findings indicate that many North American and West European investors, particularly smaller companies, have little knowledge of the Palestinian market and opportunities in the Middle East. For North American and European firms that have considered launching call center operations in the Middle East, Dubai has emerged as a top choice.

Arab Middle East

A growing IT market in the Middle East. Nearly all Middle East countries now allow public access to the Internet. There is a growth in the Internet market of about 10 percent per month, thereby creating a demand for regular telephone and special broadband infrastructure. Additionally, the personal computer market is growing at an average of twenty-five percent, and as much as forty percent in some Arab states. The growth of the computer market in the Middle East, however, has not been matched by growth in IT services. Thus, a demand clearly exists in West Bank/Gaza for technical help desks and other IT services provided through call centers.

An emerging market for call center services. While call centers, and outsourcing in general, have become established business and marketing tools in North America and Europe, the trend is new in the Middle East. Call centers are only now emerging in Turkey, Israel, and Dubai. Their presence in West Bank/Gaza and elsewhere in the Middle East is soon to follow within the next five years. In the Arabic-speaking Middle East, the United Arab Emirates seems to have taken the lead in Call Center development. The telecommunications firm, Etisalat, has just established a 300-seat call center for its own internal customer service and sales requirements. However, it will also provide outsourcing call center services for other firms.[22]

Cupola of Dubai has recently partnered with U.S. call center giant, Sitel, to build a 200-seat multi-service outsourced call center. Cupola's parent company serves primarily as a holding company for the investments of Saudi and Emirati investors who saw the

[22] TSG interview with Mr. Dominick Keenaghan of Insights Magazine, a publication that tracks the Call Center industry in the Middle East.

call center industry as a lucrative and untapped market in the Gulf Cooperation Council (GCC) market. Cupola eventually hopes to expand its operations to other countries in the region.

Fastlink, Jordan's mobile phone service provider runs its own internal customer service call center developed jointly between Lagan of Northern Ireland and IBM. Similarly, Bahrain Batelco operates a number of call centers providing directory assistance and technical help desk services. Batelco is currently looking to expand in the region.

Israel

A growing industry. The call center industry in Israel has begun to grow rapidly in the past two years. This has been fostered by the growth in telecommunications, Internet, and cellular telephone usage. As the number of Internet service providers and cellular telephone companies grew, severe competition arose in the market. Thus, companies needed a way to differentiate themselves from their competitors on a basis other than price. The solution was to offer greater customer care through call center activities. Beeper Communications is an example of a firm with a call center that initially served its own Motorola pager clients, but now accepts outsourced telesales and customer service contracts from other companies. Israeli companies are in a good position to understand the Palestinian market, and cooperative relationships have developed between the high tech business communities in Israel and West Bank/Gaza.

Opportunities for investment across the Green Line. Several Israeli call center companies expressed interest in the Palestinian market. One in particular has included West Bank/Gaza, particularly the West Bank, in its business plan. Tele-All operates a 190-seat call center in Tel Aviv that employs over 200 workers. They have plans to expand their operations, either in Tel Aviv or in the West Bank, to serve the Arab-speaking Palestinian market. According to the company's marketing director, a West Bank/Gaza-based call center could eventually serve other countries in the region—pending the available infrastructure and cost effectiveness of Paltel.

TSG also interviewed Kalanit-Carmon who provides the outsourced technical help desk services for Hewlett Packard, Microsoft, Oracle, and Novell. They have very little capacity to serve the Arab-speaking market, but are interested in exploring ways to expand their help desk services.

West Bank/Gaza

Some large multipurpose call centers do provide outsourced help desk services for IT companies. Initially, help desks have the most potential of all other call center activities in West Bank/Gaza. Safad Engineering in Ramallah, for example, is interested in starting Hewlett Packard and Microsoft Help Desk services for West Bank/Gaza. Eventually they could see this service expanding to serve the Jordanian market as well. This is dependent, however, on the flexibility of the telecommunications structure.

Demand for KTDC Facilities

The following presents the short- to long-term potential for the establishment of a call center industry at the KTDC. Call center investment in the KTDC will likely begin with small help desk services established by local IT firms, possibly in joint venture with an experienced call center or technical support firm. The KTDC might also attract the internal call center services of Palestinian banks, utilities, or private firms offering customer service or sales to their customers. With proper incentives and telecommunications infrastructure, the KTDC will have the potential to attract a larger regional call center firm to serve the Palestinian and other Arab-speaking markets.

Short-term

In the short-term, the most likely source of investment into the KTDC in the call center industry is the local Palestinian market. Small Palestinian firms will become certified help desk agents under contract from companies like Microsoft, Hewlett-Packard, and Motorola. Their presence in the KTDC will begin with one or two companies, whose size will moderately expand to serve Palestinian and Arab Israeli clients. These technical support desks might operate independently or in joint venture with experienced help desk firms like Kalanit-Carmon of Israel. The potential exists to offer help desk services to neighboring Arab-speaking countries, but this is contingent upon the deregulation of the telecommunications market.

Medium- to Long-term

In the medium- to long-term, there is potential to attract the establishment of an internal call center catering to the customer service needs of a specific company. This will be similar to the operations of Fastlink in Jordan, Etisalat in the UAE, or Batelco in Bahrain. Under this scenario, a local Palestinian bank, insurance company, telecommunications provider, or other company would locate in the KTDC, and offer customer services or sales through its own internal call center. Eventually, these internal operations might grow to a size whereby they can offer outsourcing services to other firms.

With proper incentives and telecommunications infrastructure, the KTDC might be able to attract an independent call center that serves the Arab-speaking region. This would likely occur only in the second phase of development. Large call center firms looking to expand their operations to the Middle East market might consider West Bank/Gaza as a possible location. This would only occur, however, if the telecommunications facilities available in the KTDC were on par with those in Western Europe, and overseas calls were inexpensive and reliable. One possibility is the expansion of call center firms such as Cupola in Dubai or Tele-All in Israel into West Bank/Gaza. These firms would be more likely investors than North American or European firms because they would have already established a client base in the Middle East, and are more familiar with the Palestinian market.

Demand Forecast

Based on the above, call center growth in the KTDC will begin slowly with one or two small help desks or internal call centers in the first five years. In the second phase of growth, the KTDC can expect to attract three more call center operations, one of which might serve Arab-speaking countries beyond West Bank/Gaza. These modest growth predictions are based on the current Paltel infrastructure, and lack of government incentives that specifically target call center investment.

Table 8.6 on the next page shows the average size of call centers throughout the world. Firms in the United States and Canada such as DecisionOne and Minacs Group tend to utilize a larger space per call center seat ($30m^2$) than firms such as Kalanit-Carmon ($10m^2$) or Telepower ($6m^2$) per seat. TSG assumes that call center operations in the KTDC would probably utilize $10m^2$ of space per call center seat.

The size of initial investment in call center operations varies from firm to firm. Mikben in Israel, for example began operations in 1995 with 4 employees and US$ 20,000 investment. At the time, the Mikben operation was not automated. Industry experts estimated the cost of an automated call center system to be about

Table 8.6 Space Requirements in Call Center firms

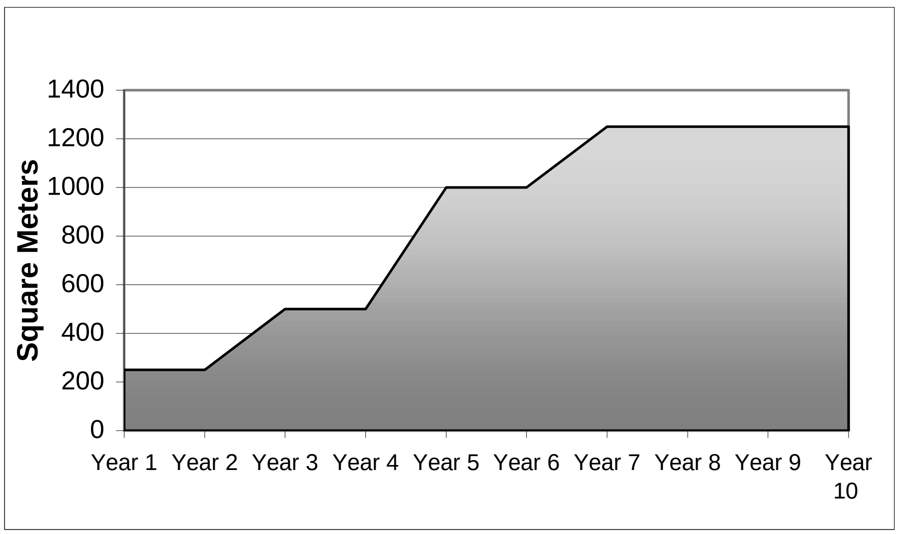
Name of Firm	Location	Physical Space	Number of Employees	Space per Call Center Seat	Work Performed
DecisionOne Corp.	Bryan, Texas (USA)	15,000 m^2	500	30m^2	Third party call center offering End User Support Services for software publishers, Internet service providers, OEMs, and commercial customers.
The Minacs Group Inc.	Auburn Hills, Michigan (USA)	10,500 m^2	350	30m^2	Third party call center handling jhelp desk for General Motors's certified auto mechanics, and GM's OnStar motorist assistance services.
ICT Group, Inc.	Langhorne, PN (USA)	3,000m^2 (Average call center size)	>5,000 total (Average 120 seats per call center)	25m^2 (Average)	Telesales, marketing, and customer care.
Beeper Communications	Tel Aviv and Haifa (Israel)	1,320 m^2 (excluding office space)[23]	550 (220 seats)	6m^2	Third party call center. Has expanded from offering personal pager services for Motorola to high end call center services such as telesales.
Telepower	Tel Aviv (Israel)	420 m^2 (including common areas)	150 (70 seats)	6m^2	Third party call center offering inbound and outbound telemarketing, appointment-making, and telephone call-in campaigns.
Kalanit-Carmon	Herzelia (Israel)	600 m^2 (onsite help desk facility only)	58 onsite help desk employees	10m^2	Under contract with Microsoft, Hewlett-Packard, and Oracle to provide technical help desk.
Mikben	Jerusalem	810 m^2	35	23m^2	Mostly outbound telemarketing services.

[23] Based on Beeper's rule of thumb of six square meters per call center seat.

US$ 4,000 per call center seat. The 60-seat Kalanit-Carmon technical support center required an initial capital of US$200,000. Miltel in Turkey expects to get its call center off the ground with an initial capital outlay between US$ 500,000 and 600,000. The initial small help desk services that locate in the KTDC will most likely require capital of less than US$ 100,000. In later phases of the KTDC development, however, a larger call center operation would invest upwards of US$300,000.

The following figure 8.3 illustrates the predicted growth of call center activity in the KTDC. The information is based on call centers that employ an average of 25 employees, utilizing 10 square meters of space per employee.

Figure 8.3
Call Center Uptake



8.4 Data Conversion and Back Office Activities

The Data Conversion industry spans a range from lower-skilled data and text entry to higher-skilled engineering use of computer-aided design (CAD). The entire industry is often subsumed under the heading "teleworking" to reflect the growing propensity of firms to outsource many of their back office operations such as data entry, payroll accounting, and digital diagram conversion. An analysis by McKinsey & Co. suggests that the untapped demand for "teleworking" services is US$250 billion.[24]

For the purposes of this report, TSG has divided the industry into Alphanumeric Conversion, Vector Conversion, and Other Back Office Activities.

- *Alphanumeric Conversion* refers to changing written text such as that found in a book or airline ticket stub to digital format. The text may be converted through the use of optical character recognition (OCR) scanning and/or keying written source materials and data into specific data fields. Software packages, either proprietary or purchased commercially, aid in the conversion process. However, data entry largely remains a very manual process. Businesses, organizations, and governments utilize alphanumeric conversion for activities such as the following:
    - Conversion of a book or library collection to CD-ROM or Internet-accessible HTML text
    - Processing health care claims forms into a patient database
    - Inputting time-sensitive financial data on market trends and consumer interests
    - Compilation and entry of surveys and questionnaires
    - Electronic conversion of a Voter's Roll database
    - Entry of coupons or airline ticket stubs
- *Vector Conversion* refers to the digital conversion of graphic data such as maps. Digitized maps contain "layers" of information such as land use and zoning, vegetation, public utilities, and population distribution. Aerial photographs of an area are typically scanned into a computer, creating a "dumb" raster image that is either digitally converted through the use of specially designed software and/or manually digitized by

[24] "Teleworking." *Business World.* June 7-21, 1999, p. 22.

redrawing lines on the computer. A database for each "layer" of the map links the physical position of items such as utility poles with their coordinates on the map. Thus, much of vector conversion activities involve the creation of a database for the client.

Although heavily software assisted, vector data conversion remains primarily a manual activity at its core. While computers are useful for recognizing frequently recurring patterns of information, the human eye is better at recognizing subtle variations in pattern such as those found on a map. Businesses, public utilities, and governments make use of vector conversion for things such as:

– Development of geographic information systems (GIS) such as the globally positioned satellite (GSP) navigation systems for automobiles
– Creation of geospatial models of electric, telecommunications, gas, and water distribution networks
– Digitization of electrical systems of airplanes, tanks, automobiles, or ships
– Creation of video games or flight simulators

- *Other Back Office Activities* include those office operations that are necessary for the normal operations of a firm, but do not reflect that firm's specialty. By outsourcing these activities to a data processing firm, companies can focus resources on their niche product or service. Examples of back office activities not included in the above data conversion categories (but often provided by the same data conversion companies) include:

  – Summary of legal depositions
  – Transcription of the taped comments and notes of physicians
  – Word processing
  – General clerical services
  – Processing payroll and billing information
  – Credit appraisals.

Industry Complexion

This section briefly describes the history and structure of the worldwide alphanumeric conversion, vector conversion, and back office industry. Although each sub-sector of the industry requires different skills, training, and labor costs, they all lie some point along the value chain of remote processing services. A small company, for example, that begins operations by offering remote secretarial services or medical transcription can graduate to offering database management and alphanumeric conversion of documents for clients.

Back Office Activities

Remote processing of back office operations lies at the lower end of the remote processing services spectrum. Traditionally, companies located their back office operations such as payroll accounting and billing within the company headquarters to assure close supervision and quick turnaround of activities. However, rising costs and advances in optical fiber telecommunications networks in the 1980s made for greater locational flexibility as large firms began to locate their back office operations in cities with lower land and labor prices. American Express Corporation, for example, moved its back office operations from its New York City headquarters to Salt Lake City, Utah and Phoenix, Arizona where labor and land cost the company less money.

A growing trend has also been to locate back office operations offshore in countries such as India, Philippines, or the Caribbean where there is an abundance of highly skilled English-speaking workers. Remote processing is typically undertaken by companies in industries such as airlines, insurance, and publishing where there is a competitive pressure to enhance productivity. General Electric, for example, established GE Capital International Services near Delhi, India to manage the firm's payroll and accounting for its worldwide operations.[25]

While large corporations such as General Electric established its own remote back office operation, other organizations such as insurance companies, hospitals, law offices, and municipal bodies began to outsource these operations to companies that specialized in back office operations such as data entry, word processing, billing, and accounting. OpenWorld Data Ltd., for example, is an offshore processing center located in Zimbabwe that provides word processing, financial data extraction, and voice

[25] "Teleworking," *BusinessWorld.* Jan 7-21, 1999, p. 22.

mail and audio/video tape transcription for companies in Europe and North America.

Link to Call Centers

Data entry and back office activities both utilize advanced telecommunications and access to inexpensive multilingual skilled labor. Therefore, these activities often operate out of large call center operations. Call center services such as telemarketing and sales order entry are often linked to activities like customer billing and database creation. The whole call center and data entry business often follows on the heals of the financial, credit card, and insurance industries.

Advanced Data Conversion

Alphanumeric and vector data conversion lie higher on the value chain of remote processing services. Like simpler back office operations like word processing and audio transcription, complex data conversion remains dependent on state-of-the-art telecommunications and a large pool of skilled labor.

The government, business, and education sectors are adopting GIS technology worldwide at an increasing rate because of improvements and lower prices of computer hardware and the increasing power, versatility, and sophistication of GIS software. Many data conversion firms have invested a lot of capital in the creation of their own conversion software.

Public utility companies, municipalities, and private enterprises are in large demand for data conversion services. In the United States alone, over 70,000 local and state governments are currently not served by GIS technology. These bodies will eventually convert their public utility, population, zoning, and other databases into a graphically digitized map system. Thus, there exists a huge growth potential for GIS technology throughout the world. In the mid 1990s, the sale of GIS products was a US$ 10 billion per year industry.[26]

[26] Paula J. Stevenson, "The Problem of Data Conversion," *Geo Info Systems,* February 1995.

Worldwide Market

Figure 8.4 Estimated Worldwide Market of Data Conversion (US$ billion)[27]

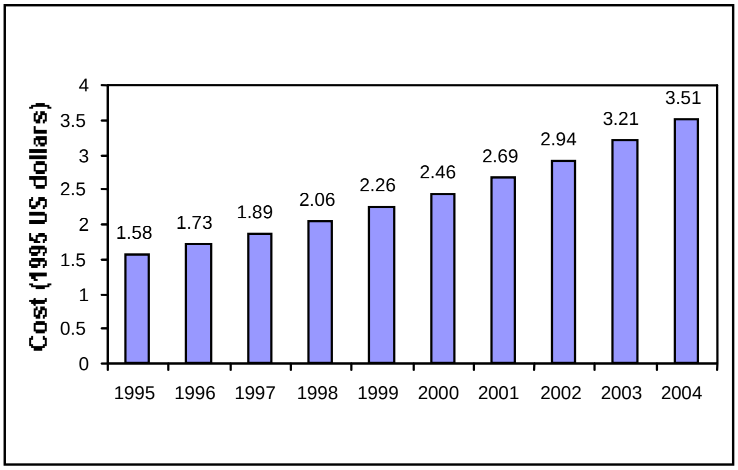


Figure 8.4 above illustrates the projected annual worldwide market for data conversion activities (in 1995 US$ billions). By 2004, the annual market for digitizing data throughout the world will reach over US$ 3.5 billion. Although assisted by technological tools such as optical scanners and computer-assisted design, data conversion remains a very costly and labor-intensive activity.

Industry Demand Profile

The following section compares the requirements of the data conversion and back office activity industry with the attributes of the proposed KTDC. Table 8.7 on the next page depicts the demand profile for Alphanumeric Conversion, Vector Conversion, and Back Office Activities compared with the attributes of the KTDC.

The two most important requirements of the industry are a large pool of skilled unemployed workforce upon which firms can draw employees, and access to inexpensive and state-of-the art telecommunications.

Labor Cost And Skills

The primary motivation for locating back office activities such as payroll accounting offshore is the lower cost of labor. Other considerations such as worker productivity, skills, and labor turnover remain just as important as the wage rate.

[27] Paula J. Stevenson, "The Problem of Data Conversion," *Geo Info Systems,* February 1995.

Table 8.7 Demand Profile for Data Conversion and Back Office Activities

Factor	Alphanumeric Conversion	Vector Conversion	Other Back Office Activities	Khadoury TDC
Labor Availability	Multilingual workers with computer skills. Data entry requires character recognition. Some conversion jobs require recognition of language and literary patterns. Training is important. Requires intelligent workers with a lot of patience.	At least a two-year technical degree with engineering and/or drafting experience. On-the-job training is necessary. Takes over one year to master job.	Transcription and answering service activities require multilingual workforce. Accounting and payroll jobs require accounting background.	Supply of engineering and technical graduates.
Labor Costs	Important. Must be less expensive than country of client.	Somewhat important. Skills are more important.	Important. Must be less expensive than in country of the client.	Relatively cost competitive vis-à-vis other Middle East locations, but higher than China or India.
Transportation	Not important if documents can be sent electronically. Important if documents are in hard copy form.	Not important if documents can be sent electronically. Important if documents are in hard copy form.	Not important if documents can be sent electronically. Important if documents are in hard copy form.	Delays in importing and exporting, as well as added costs for security checks required by Israel.
Power Infrastructure and Costs	Requires steady supply of power for multi-shift operations.	Requires steady supply of power for multi-shift operations.	Requires steady supply of power for multi-shift operations.	Possible to provide reliable, relatively low-cost power supply.
Water Infrastructure and Costs	Not important.	Not important.	Not important.	Water supplied to the KTDC.
Telecom Infrastructure and Costs	Very important. Jobs received and delivered electronically.	Very important. Jobs received and delivered electronically.	Very important. Jobs received and delivered electronically.	Possible to provide low-cost high-quality service with on-site teleport.
Technical Support Services	Computer technical support necessary.	Computer technical support necessary.	Computer technical support necessary.	Ample supply of trained technicians in region.
Financial Support	Important for local start-up firms. Not important for overseas client or parent company-owned operations.	Important for local start-up firms. Not important for overseas client or parent company-owned operations.	Important for local start-up firms. Not important for overseas client or parent company-owned operations.	Some VC funding available.

Data conversion is an activity that must be responsive to frequent changes in requests by clients. Employees, therefore, must be very flexible in order to effectively and efficiently serve their clients.

Tables 8.8 and 8.9 below show the comparative salaries of higher value vector conversion and lower value data entry in West Bank/Gaza and in selected industry locations worldwide.

Table 8.8 Vector Conversion Salaries

Country	Higher-Value Vector Conversion Salary[28]
United States	US$ 2180 – 2520/month (basic)
Israel	US$ 1000/month (basic) US$ 1,400/month (fully burdened)
West Bank/Gaza	US$ 300/month (basic)

Table 8.9 Lower-Skilled Data Entry Salaries

Country	Lower-Value Data Entry Salary
United States (Medical Transcription)	US$ 2085/month (basic)
United States (Data Entry Keyers)[29]	US$ 1000 – 2855/month (basic)
West Bank/Gaza (Low-skilled Labor)	US$ 200 – 400/month
Caribbean (Data Entry Keyers)[30]	US$ 135 – 485/month
India (Medical Transcription)[31]	US$ 100/month (basic)

Back office activities such as audio transcription and word processing require fluency in the language of the client company. Since North American companies remain the largest outsourcers of back office operations, fluency in English remains a requirement. This is one of the reasons why countries like India, Barbados, Jamaica, and the Philippines remain popular destinations for data entry operations.

For more complex conversion activities that utilize GIS technology, workers need drafting skills and an ability to read and understand drawings. In addition to a technical school education,

[28] TSG Research
[29] California Occupational Guide #16. Interest Area 7, 1997. March 3, 1998.
[30] Bibby, Andrew. "Offshore Data Processing." *Teleworker* Magazine. Dec 97/Jan. 98.
[31] "Teleworking." BusinessWorld. Jan. 7-21, 1999, p. 24 – 25.

workers need additional onsite training in order to become proficient at the job.

While the KTDC will not be able to compete with such low-cost sites as India, the continuing growth of this sector in the United States indicates that low labor costs are not as important as access to the right labor skills. West Bank/Gaza's high literacy rates and large pool of unemployed and underemployed, but educated, labor can provide KTDC-based firms with the types of skills they require.

Telecommunications

An inexpensive and reliable telecommunications infrastructure is critical for the development of a data conversion industry. Telecommunication services operating at high bandwidths of at least 64 Kbps are recommended for vector conversion and other remote data processing services. Additionally, the telecommunications system should allow for high speed data transmission, and access to the use of international toll free services. A deregulated environment for telecommunications services at the KTDC will be essential in developing a data conversion industry.

Transportation

Competing outsourced data conversion locations such as Jamaica, India, Philippines, and China do not have the same import and export restrictions that West Bank/Gaza has vis-à-vis its relationship with Israel. Data processing centers in the Caribbean, for example, receive hard copy documents (coupons, ticket stubs, maps, books, etc.) that arrive via air or ship. Once entered, processed, or digitized, the final product can be delivered on forms such as diskette, CD- ROM, or through e-mail. Because of added border and Customs inspections imposed upon West Bank/Gaza, in the near term, the KTDC probably cannot become competitive in data conversion that requires a high-volume of hard copy source material. This will change when transportation and shipping restrictions are eased in the future. However, transportation is gradually becoming less of an issue as companies are sending data electronically to their remote processing centers.

Electricity

Data entry and back office operations rely upon a steady, uninterrupted supply of electricity. Large data conversion companies often lease a remote processing site used in the event of a prolonged electrical service disruption. The KTDC, with a direct connection to the Israeli grid, will be able to supply the necessary electricity, though at a higher cost than alternative locations in the Middle East region.

Training

On-the-job training is extremely important for both back office activities and complex data conversion. Barbados, a leader in "teleworking" activities, has established a joint private sector and government-sponsored training program that prepares job applicants for entry into the information processing market. Workers require training specific to the work they are doing. Medical transcriptionists in India, for instance, require training in medical terminology and colloquial idiomatic expressions. Rigorous training in computer-aided design is required for employees that digitize the maps for electronic navigation systems and other GIS products. The KTDC, with its own market-driven training center, can play an important role in ensuring that these skills are available to potential investors.

Potential Sources of Investment

This section describes the potential sources of investment in data conversion and back office activities for the KTDC.

West Bank/Gaza and Israel

Government needs can jumpstart the data conversion industry. TSG findings indicate that there is strong potential for data conversion and vectorization activity in a technology park in West Bank/Gaza. TSG interviewed two firms that expressed interested in such a project. One is Atlas Geomatics; the other is a consortium of Israeli and Palestinian firms led by the Israeli firm Or Hi-Tec. The Palestinians will be faced with urban planning, mapping, zoning, voter registration, demographics, and related concerns. The data conversion/GIS activities described above cater to that need.

However, in order for the data conversion industry to take off in a Palestinian technology park, there needs to be a guaranteed stream of work—probably in the amount of about US$500,000 per year. The PA, with its varied data conversion needs, would be an obvious client to supply that contract. A great need exists to digitally map the municipalities and rural areas of West Bank/Gaza—with different "layers" depending on the needs of the government. These layers could include land ownership, population demographics, utilities, sewerage, commercial zoning, and vegetation. Both Atlas Geomatics and the Or Hi-Tec Consortium felt that this was the only way that a data conversion industry could be jumpstarted in West Bank/Gaza. Eventually, smaller projects would grow around the core steady stream of work, and the business would become self-sustainable. Some have suggested that a mapping project could be initiated with funding from a multilateral lending agency.

International

Little exposure to opportunities in the Middle East. TSG findings indicate that the data conversion industry in the United States has had little exposure to the Middle East market and opportunities for its development. All the American data conversion firms that TSG interviewed had little interest in investing in West Bank/Gaza or the Middle East. Tomahawk II, Inc. outsources some of its data conversion work to India and China, and Emery DataGraphic maintains all of its conversion work in Denver, Colorado (USA). APEX Data Services Inc. maintains its six overseas production centers in India. The firm had explored the idea of investing in Egypt about ten years ago. However, they found the Egyptian business climate to be very difficult, and not favorable for investment. When they first invested in India, it was amidst a climate of bribery and government corruption. If the firm invests overseas in the future, it does not want to relive this experience.

In the short-run, it is unlikely that the KTDC will attract investment from the United States or Europe, given the still nascent nature of the industries that are likely to drive the data conversion market in the Arab Middle East (finance, insurance, etc.).

Demand for KTDC Facilities

This section presents the potential for the establishment of a data conversion industry at the KTDC. Given the virtual absence of this industry in West Bank/Gaza at the present, the PA can play a strong role in jumpstarting the industry.

Short-term

In the short-term, the needs of the PA government – including GIS mapping, population registration databases, and urban planning projects - indicate a potential focus on activities at the high end of the remote processing value chain. Given a steady stream of work from the PA, there is strong potential for the KTDC to attract Israeli-Palestinian joint ventures or other partnership agreement.

There is also potential for the KTDC to attract small Palestinian companies operating at the lower end of remote processing services, including back office services, since initial start-up costs are relatively low.

Medium- to Long-term In the medium- to long-term, as the industry becomes more established and the regional market for such services grows, the KTDC will have the potential to attract investments from the U.S. and/or Europe. Local companies are likely to expand their services to include more complex digitization database management activities.

Demand Forecast Workspace in data conversion and back office operations firms varies greatly with the location of the firm. Table 8.10 below shows several companies, their locations, employment, and under-roof space per worker Firms in the United States allocate approximately 30 square meters per employee, while firms in Israel utilize about 10 square meters of space per employee. For the purposes of this analysis, TSG assumes that data conversion activities in the KTDC will consume approximately 10 square meters of space per worker.

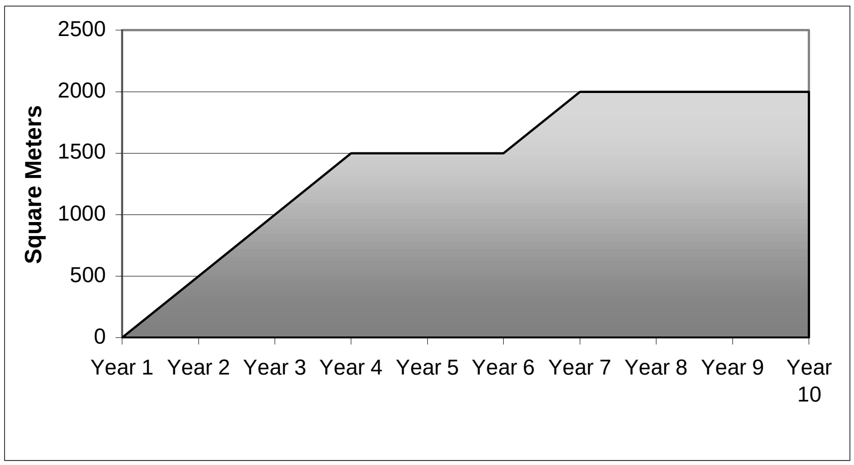
Table 8.10 Space Requirements in Data Conversion firms

Name of Firm	Location	Physical Space	Number of Employees	Space per Employee
I & A International[32]	Hyderabad (India)	90m^2	19	4.7m^2
Tomahawk II, Inc.	California (USA)	9,000m^2	100 – 300 (depending on season)	30m^2
Emery Datagraphic	Colorado (USA)	3,105m^2	100	31m^2
APEX Data Services	Virginia (USA) and 6 centers in India	30,000m^2 (total of all locations)	1,800	16.67m^2
Atlas Geomatics	Herzelia (Israel)	500m^2 (Jerusalem) 250m^2 (Herzelia)	75	10m^2
Hilan Ltd.	Tel Aviv & Haifa (Israel)	3,000m^2 (Tel Aviv) 650m^2 (Haifa)	200 (Tel Aviv) 30 (Haifa)	15.9m^2 (Average)

[32] BusinessWorld, “Teleworking: The Hottest Business Opportunity for India.” Jan. 7-21, 1999.

The size of the average investment in data conversion or back office operations varies depending on the size of the operation. In the short-term, it is expected that a Israeli-Palestinian joint venture would employ approximately 40 people, with an initial capital investment of US$ 500,000, based on TSG research of similar projects in Israel and the region. In the medium- to long-term, the size of investments is likely to grow, both in terms of capital and employment. The following figure illustrates the predicted growth of data entry and back office operations in the KTDC. The information is based on firms that employ an average of 50 employees that utilize 10 square meters of space per employee.

Figure 8.5 Data Conversion and Back Office Operations Space Uptake



8.5 Consumer Electronics and Electrical Appliances

The consumer electronics and electrical appliance sector comprises a wide range of products, including office machinery (typewriters, computers, calculators, etc.), household appliances (refrigerators, vacuum cleaners, small kitchen appliances, etc.), consumer electronics (TVs, stereos, VCRs, etc.), and telecommunications equipment (telephones, mobile phones, satellite receivers, etc.), as well as parts and components for all of the above.

As in any other manufacturing sector, the development of each of these products is composed of a number of discrete activities, including product design and engineering, manufacturing, assembly, as well as after-sales repair and maintenance. “Manufacturing” is defined as the transformation of “completely knocked-down” (CKD) kits into “semi-knocked down” (SKD) units “Assembly” is defined as the transformation of SKDs into finished products, or “completely built up” (CBU) units.

The following sections will identify the specific activities, market niches and sources of investment that demonstrate the greatest potential for the KTDC.

Industry Demand Profile

The following section matches the factor requirements for the consumer electronics and electrical appliance industry with the KTDC environment. As demonstrated in Table 8.11 below, the KTDC will provide a promising location for investment in this sector. The KTDC’s connection to the Israeli power grid, which will be required to meet the demand for electricity within any large-scale development in Tulkarem, will provide the required supply of reliable electricity to KTDC tenants. With relatively low costs for land and construction in the Tulkarem region, the KTDC will be able to provide low-cost factory space to incoming investors.

One of the most important factors for investment is the access to qualified, relatively low-cost labor. The KTDC will be able to provide the industry with a growing supply of qualified engineering graduates and technicians. In 1997, while only 70 graduated from relevant university engineering programs (electronic engineering, electrical engineering, information systems engineering, and computer systems engineering), almost 900 university students are currently enrolled in these programs, which will translate into a

Table 8.11 Demand Profile for Electronics & Electrical Appliances

Factor	Design/ Engineering	Assembly & Manufacturing	Repair	Khadoury TDC
Labor Availability	Qualified electronic and electrical engineers	Qualified electronic and electrical engineers, technicians, and skilled labor	Qualified electronic and electrical technicians	Relative supply of engineering graduates and technicians. Few with higher levels of expertise (for product design and engineering).
Labor Costs	Not as important as skills	Important – need to be competitive with alternative production locations	Important – need to be competitive with alternative production locations	Relatively cost competitive vis-à-vis other Middle East locations, but higher than other locations
Transportation	Low-cost, timely transport of incoming materials and outgoing finished products is of relative importance	Low-cost, timely transport of incoming materials and outgoing finished products is of relative importance	Low-cost, timely transport of incoming materials and outgoing finished products is of relative importance	Delays in importing and exporting, as well as added costs for security checks required by Israel
Power Infrastructure and Costs	Reliable, relatively low-cost power supply required	Reliable, relatively low-cost power supply required	Reliable, relatively low-cost power supply required	Possible to provide reliable, relatively low-cost power supply
Water Infrastructure and Costs	Not very important	Not very important	Not very important	-------
Telecoms Infrastructure and Costs	Relatively important	Relatively important	Relatively important	Possible to provide low-cost, high-quality service through on-site teleport
Technical Support Services	Repair and maintenance for hardware	Repair and maintenance for machinery	-------	Relative supply of trained technicians in region
Financial Support	Often need for venture capital funding	Not very important	Not very important	Some VC funding available

greater number of graduates in the future. At the technician level, in 1997, more than 180 students are enrolled at Palestinian technical colleges in the relevant disciplines (electrical engineering, telecommunications, computer technology, and technology of radio, television & video).

Throughout the course of this study, TSG consulted numerous, individuals, organizations, and other studies were consulted regarding both the quantity and skills levels of West Bank/Gaza's engineers and technicians in West Bank/Gaza – including local Palestinian software houses, foreign investors familiar with Palestinian computer science graduates, and the computer science departments of local universities. TSG findings indicate that local engineers and technicians possess a solid background at the theoretical level, but need more practical experience, which can only be provided through exposure to industry. In addition, the level of expertise of local professionals is not very high, in terms of product design and engineering, which mirrors the general level of sophistication of local industry, in terms of the types of products that are being produced (mostly household appliances and basic consumer electronics). While this is discussed in more detail below, it is important to note that current skills levels and local industry experience are not oriented toward product design and engineering as much as manufacturing, assembly, and after-sales services.

One obstacle to investment in this sector is the difficulty associated with importing goods into and exporting goods from West Bank/Gaza. While the cost of transportation is relatively competitive, importers and exporters sometimes experience long delays due to the security requirements of the Israeli authorities. With the growing demand for just-in-time manufacturing,[33] any import/export delays can reduce the competitiveness of the KTDC as a site for the manufacture of goods. However, given the focus of the following analysis on the potential for investment based on regional import substitution (*i.e.* to serve the regional market), potential delays in Israeli ports would be reduced as most products would be shipped by land to their final destinations.

In terms of overall industry requirements, the KTDC can provide a favorable location for the consumer electronics and electrical

[33] According to a 1998 survey of household appliance and consumer electronics manufacturers, conducted *by Appliance Manufacturers* magazine, almost 65 percent of have just-in-time delivery programs.

appliance sector, particularly for assembly and repair/maintenance activities. While the potential for product design and engineering remains low in the short-term, based on existing skills and experience, as local experience develops over time, there would be greater potential for local design and engineering, as well as pilot manufacturing of prototypes adapted to regional market requirements.

Potential Sources of Investment

The following sections evaluate the potential for sources of investment in consumer electronics and electrical appliances for the KTDC. For each potential source, a broad overview of the industry structure is provided, followed by specific industry trends that are likely to impact interest in the KTDC. The last two sections discuss the specific market niches that are likely to attract the greatest degree of investment from each potential source, and the demand for different KTDC facilities.

Israel

A growing domestic industry. The Israeli consumer electronics and electrical appliance sector is relatively small. While the electronics industry – including both components and final products - is one of Israel's fastest growing sectors, a large proportion (45 percent in the case of components) is oriented toward the military, aerospace, and satellite communications sectors, sectors over which Israel maintains tight control. Nevertheless, Israel's consumer electronics industry accounts for a significant proportion of sector output. In terms of household appliances, Israeli companies supply the domestic market with more than US$120 million of goods. Israel also supplies 25 percent of its domestic market for civilian communications equipment. Together, these three sub-sectors – consumer electronics, civilian telecommunications equipment, and household appliances – provide substantial potential for either joint ventures or sub-contracting arrangements "offshore".

The move to offshore manufacturing driven by labor costs. While the Israeli electronics sector has been hesitant in the past to move production and assembly activities offshore due to the sensitive nature of much of its output, a growing number are turning to overseas locations, particularly in East Asia, to control costs and focus on product design and engineering rather than manufacturing and assembly. While West Bank/Gaza cannot compete with East Asia in the precision assembly of components, the KTDC's proximity and relatively cheap pool of qualified manpower (vis-à-vis Israeli engineers and technicians) makes it a competitive location for the manufacturing, assembly and repair of final products, including consumer electronics, household appliances and telecommunications equipment, such as handsets and mobile phones. One company, Synel Industries, a leading producer of data collection and time management systems, has licensed Aljarmaq, based in Ramallah, to assemble time management terminals for the region. Such sub-contracting arrangements, as well as licensing agreements and joint ventures, can reduce the costs of product development of Israeli manufacturers.

International

Worldwide industry structure mirrored by regional imports. The consumer electronics and electrical appliances industry is dominated by manufacturers in Europe, Asia, and the United States. While there are literally thousands of producers in these locations,[34] there are only a relatively small number of brand-names that are recognized worldwide, which are also the leading suppliers to the Middle East market. Table 8.12 below provides details of the leading sources of consumer electronics and

Table 8.12 Leading Sources of Consumer Electronics and Electrical Appliances Imports to Regional Markets (1997)

Source of Imports	Share of Imports
Denmark	12.1%
Italy	11.1%
United States	10.1%
Japan	9.7%
Korea	9.0%
China	7.0%
Great Britain	6.4%
Netherlands	4.8%
Singapore	4.3%
Malaysia	4.2%
France	3.8%
Hong Kong	3.0%
Taiwan	2.6%
Spain	1.7%
Taiwan	1.5%

[34] According to the Bethseda List Center, there are more than one million producers of electronic and electric products worldwide (including components).

electrical appliances imports to several Middle East markets, which is fairly representative of the entire region.[35] The top five countries account for more than 50 percent of regional imports; the top fifteen countries account for more than 90 percent of imports, while the remaining 62 countries, together, account for less than 10 percent. These top countries, and their leading manufacturers, represent the most promising opportunities for investment in the region, based on the potential for regional import substitution.

In terms of product categories, leading imports into the region include: major white goods (clothes washers and dryers, refrigerators, dishwashers), small kitchen appliances, televisions and radio receivers, vacuum cleaners, personal care appliances (shavers, hairdryers), telephone sets, and some office appliances (photocopiers, adding machines).

Leading manufacturers already moving to invest in the region. Many of the leading consumer electronics and appliance manufacturers are already moving to supply the region through “point-of-sale” manufacturing and assembly plants throughout the Middle East. Details of recent investments into the region are included in Table 8.13 below. Most significant is the recent agreement reached between Samsung, Korea’s leading consumer electronics and appliance manufacturer, and the West Bank/Gaza Electronic and Electrical Company (PEEC). PEEC will manufacture and distribute Samsung products from its production site in Nablus – including televisions, refrigerators, washers, and mobile phones – for the local and neighboring markets. The agreement fits in with Samsung’s strategy to increase its market share through an active presence in the Middle East. Other recent investments in the region indicate that other leading consumer electronics and electrical appliance manufacturers are following similar strategies. Given the relative supply of low-cost, qualified labor in West Bank/Gaza - combined with preferential access to the Israeli, Egyptian and Jordanian markets - the KTDC can provide a competitive environment for other manufacturers to expand their role in the region, through either joint ventures, sub-contracting or licensing agreements.

[35] Includes Israel, Egypt, Turkey, Saudi Arabia, and Oman. Data for other markets was not available.

Table 8.13 Electronics and Electrical Appliance Industry Investments in Middle East

Country	Investor(s) (Home Country)	Subsector	Investment Type	Local Partner(s)
Egypt	LG Electronics (Korea)	Washing machines, air conditioners, color picture tubes, other components	Greenfield (1990)	
	Fagor Electrodomesticos (Spain)	Refrigerator assembly	Joint venture (1995)	n/a
Turkey	Whirlpool (United States)	Dishwashers	Sub-contracting/licensing agreement (1996)	Arcelik
	AEG (Germany)	Electrical appliances	Equity investment (1996)	Profilo Electrical Goods
	Bosch-Siemens Hausger (Germany)	Electrical appliances	Equity investment (1995)	Profilo Electrical Goods
	Bosch-Siemens Hausger (Germany)	Washing machines and dishwashers	Existing investment expansion (1996)	Profilo Electrical Goods
	Merloni Elettrodomestici(Italy)	Refrigerators	Acquisition (1994)	Pekel
	Solac (Spain)	Domestic appliance distribution	Strategic partnership (1995)	n/a
	Derby A/S (Denmark) and Danish Industrial Fund for Developing Countries (Denmark)	White goods	Joint venture (1993)	Klimasan SA
Jordan	Goldstar (Korea)	Refrigerators, washing machines, vacuum cleaners, and color televisions	Greenfield (1993)	
Israel	Carrier (United States)	Air conditioning systems	Equity investment (1997)	Tadiran Appliances
	Samsung (Korea)	Electronics	Greenfield (1997)	
	Home Products International (United States)	Home improvement products	Equity investment/merger (1997)	ZAG Industries
	American Micro Systems Inc. (United States, Japan)	Electronics design services	Joint venture (1996)	Vectronics Ltd.
	Siemens (Germany)	Electronics	Greenfield (1995)	Siemens Israel
	n/a (Singapore)	Internet home television	Equity investment (1998)	Video Surfer (VS) Israel
West Bank/Gaza	Samsung (Korea)	Televisions, washers, refrigerators, air conditioners, mobile phones, others	Licensing Agreement (1998)	West Bank/Gaza Electronic and Electric Company
Saudi Arabia	Solac (Spain)	Domestic appliance distribution	Strategic partnership (1995)	n/a
	Electrolux (US)	Vacuum cleaners	n/a	n/a

Country	Investor(s) (Home Country)	Subsector	Investment Type	Local Partner(s)
Bahrain	Onida Savak (India)	Television sets, washing machines	Joint venture (1995)	Brahmco Industries, Kewal Ram and Sons, Zeng Industries
Iran	Fagor Electrodomesticos (Spain)	Washing machines	Joint venture (1995)	n/a
	Maytag Corporation (United States)	Washing machines	Sub-contracting/licensing agreement (1993)	Bayatec
	Maytag Corporation (United States)	Refrigerators and floor care equipment	Joint venture (1993)	Bayatec
	Various European manufacturers	Refrigerators and household goods	Sub-contracting/licensing agreement (1993)	Bayatec
	Matsushita (Japan)	Vacuum cleaners, small kitchen appliances	Joint venture	National Electric Industrial Co.
Yemen	Bajaj International (India)	Electrical appliances	Strategic partnership (1995)	H.S.A. Group

Source: IAC-Insite; industry publications.

Regional sales translate into opportunities to supply after-sales services. In addition to investment in assembly activities, there is also potential for the KTDC to attract investment in after-sales repair and maintenance services for the regional market. Growing sales into the region will drive the need for authorized service centers – through either direct investments by manufacturers or sub-contracting/licensing agreements with third party vendors. Based on current trends in the region, the latter option appears to provide greater potential as most repair services in the region are conducted by authorized third party vendors rather than directly by the manufacturers.

West Bank/Gaza

A growing but fragmented industry. The consumer electronics and electrical appliance sector in West Bank/Gaza is largely inward-looking, with virtually zero exports, except to Israel. Like its neighbors, West Bank/Gaza imports a relatively large quantity of consumer electronics and electrical appliances to meet domestic demand. Local industry has grown relatively fast, from approximately 85 enterprises in 1994 to close to 150 in 1997, although most of these enterprises are engaged primarily in distribution and repair, versus manufacturing or assembly. In 1997, these 150 enterprises employed more than 500 people, with the majority of enterprises employing less than 5 people. The PEEC project, which came into operation at the end of 1998, is the only larger-scale enterprise within the sector, with approximately 55 employees. Within the sector, local industry is oriented most toward the manufacture of household appliances, as well as some office machinery, and assembly of computers (CPUs).

Limited opportunities to attract local producers. While the previous sections demonstrated the opportunities for the KTDC to attract local producers in partnership with large Israeli and multinational manufacturers, in the short-term the KTDC is less likely to attract indigenous manufacturers, given the very small scale of their operations and lack of export orientation. However, as local engineers and technicians gain experience over time, through their exposure to Israeli and multinational operations, there is potential to attract new local investment in assembly that is more outward looking, as well as upcoming entrepreneurs with the capacity to design and engineer new products for the regional market.

Demand for KTDC Facilities

The following presents the short- to long-term potential for the establishment of an electronics industry at the KTDC. While this sector is promising in terms of investment, as well as employment generation, the role of such activities should be limited at the KTDC, given the low-tech nature of such assembly operations and suitability of alternative industrial sites in the region. However, the presence of a consumer electronics or telecommunications equipment plant (versus household appliances) can play a positive role in the KTDC's development, providing opportunities to Khadoury students for hands-on industry experience. In addition, their presence can provide the basis for higher-tech activities, such as product design and pilot manufacturing, as local skills and experience develop over time.

Short-term

In the short-term, electronics manufacturing activities will be based on the existing skills base and local industry experience, *i.e.* manufacturing and assembly of consumer electronics and basic telecommunications equipment. The KTDC has the potential to attract both Israeli and multinational electronics manufacturers:

- Israeli manufacturers, particularly in consumer electronics and telecommunications equipment, seeking to move their manufacturing and assembly operations to lower-cost locations "offshore", either through direct investment/joint ventures or through sub-contracting/licensing agreements with local producers;

- multinational and Israeli manufacturers interested in accessing the growing regional market through "point-of-sale" manufacturing and assembly operations, either through direct investment/joint ventures or through sub-contracting/licensing agreements with local producers.

In addition to investment in assembly activities, there is also potential for the KTDC to attract investment in after-sales repair and maintenance services for the regional market. Growing sales into the region will drive the need for authorized service centers – through either direct investments by manufacturers or sub-contracting/licensing agreements with third party vendors. Based on current trends in the region, the latter option appears to provide greater potential as most repair services in the region are conducted by authorized third party vendors rather than directly by the manufacturers.

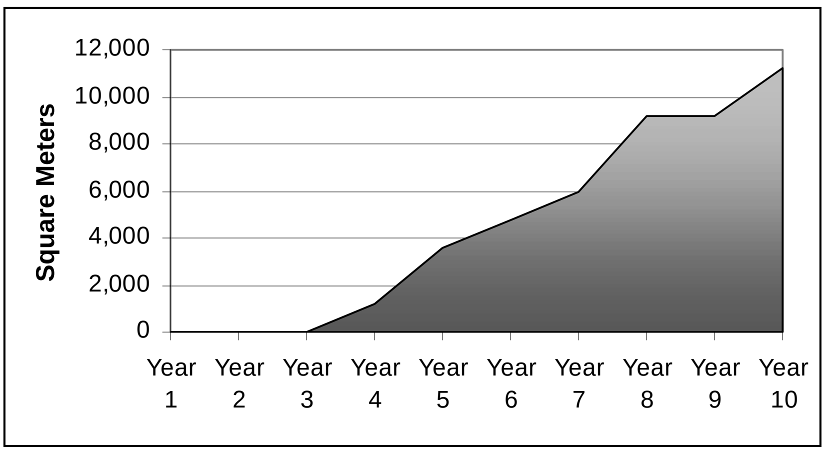
Medium- to Long-term

In the medium- to long-term, as skills and expertise develop, the KTDC has the potential to attract, in addition to the above, the KTDC will attract higher-tech design and precision assembly activities, as well as local entrepreneurs with export-oriented manufacturing and assembly operations or capacity for product design and engineering.

Demand Forecast

As discussed above, the number and type of investments should be controlled by KTDC management in order to ensure the integrity of the KTDC concept. Investment projections, including employment, capital investment, and space requirements are based on the average size of similar investments entering the region and similar investment locations worldwide. The average size of investment will between US$1 million and US$2 million, with employment ranging from 30 to 70 employees. Space allocations are based on an industry average of 30 to 40 square meters per employee. Figure 8.6 below displays the projected demand for KTDC facilities.

Figure 8.6 Manufacturing Uptake



8.6 Education & Training

The development of the KTDC, based on the industry niches identified in the previous sections, will provide opportunities for park-based education and training initiatives, including private direct investment. While the successful development of these industries will require the development of West Bank/Gaza-wide and KTDC-based public education and training support systems, which will be discussed in detail in Chapter 9 of this report, the park itself can be a catalyst for inward investment in private on-site education and training facilities. This chapter focuses on the potential to attract private investment in the education and training sector at the KTDC.

As discussed in the previous sections, while the existing human resource base in West Bank/Gaza is sufficient to attract investment into the identified industry niches – including software programming, electronics assembly, call centers, and remote office services - there are several human resource “gaps” that can be filled through on-site education and training.

- There is also potential to attract private-sector investment in IT training services, such as computer language and system certification programs. While several local companies and public institutions have begun offering training programs, both authorized and unauthorized, growing interest of local graduates in the IT sector has produced a shortfall in the supply of such programs, particularly outside Ramallah. The development of a dynamic software industry in the KTDC, with the ability to compete internationally, will require the expansion of certification training and testing programs in West Bank/Gaza, which could be provided on-site to meet the needs of tenants and graduates in the region.

- Many local entrepreneurs lack basic management and marketing/business development skills. Park-based training programs in these fields would provide a complement to an incubator-style program.

The following sections evaluate the KTDC’s potential to attract private investment in on-site education and training programs.

Demand Profile for Education and Training

A training facility at the KTDC would require significant investments in both infrastructure and personnel in order to attract private investment. Table 8.14 below demonstrates the industry demand profile for on-site training programs.

Human Resources

The most important factor for investment in on-site training is access to qualified instructors, as well as quality managerial and administrative staff. While qualified trainers in IT-related subjects are currently in relative short supply in the Palestinian territories, particularly for professional-level programs – given the scarcity of practical experience – TSG survey findings, based on interviews with leading local and Israel-based companies indicate the positive potential for "training the trainers" up to international standards. Several Israel-based companies that have recently invested or are in the process of investing in West Bank/Gaza are confident that their first trainees, who are being trained "in-house", will be able to instruct their fellow Palestinian colleagues in the new ventures. Instructors in marketing and business management, while in short supply on the Palestinian side of the Green Line are in accessible from the Israeli side.

Table 8.14 Demand Profile for Education and Training Programs

Factor	**On-Site Training**	**Khadoury TDC**
Labor Availability	Qualified instructors, management and administrative skills	While management and administrative skills are available, there is a need to "train the trainers," particularly on-site instructors
Labor Costs	Not very important	-------
Transportation	Not very important	-------
Power Infrastructure and Costs	Reliable, relatively low-cost power supply required	Possible to provide reliable power supply, but at higher cost than other locations in region
Water Infrastructure and Costs	Not very important	-------
Telecoms Infrastructure and Costs	Requires low cost, state-of-the-art telecoms	Teleport can provide low cost, modern telecoms infrastructure
Technical Support Services	Qualified technicians for software and hardware repair and maintenance	Growing local supply of technicians for software and hardware repair and maintenance
Financial Support	Often need for funds both for infrastructure and to subsidize student fees	PA and/or donor assistance will be required to subsidize the cost of infrastructure and course provision

Telecommunications

Quality telecommunications infrastructure is also an important factor for the location of an on-site training facility, particularly for one oriented toward IT training. The development of a deregulated teleport operation at the KTDC will be essential in ensuring low-cost access to the required telecommunications infrastructure.

Funding

A third factor for site selection is the ability of students to pay for the courses. The cost of providing a certification program averages US$3,000 to US$5,000 per student, a sum that is beyond the means of students in developing countries. PA government or donor-funding will be required to ensure that students have access to the IT programs that they require.

Based on the above, it is less likely that investment will take place in on-site marketing and business management courses; demand for these courses could, instead, be fulfilled through access to “overseas” expertise provided through distance learning. On the other hand, investment in IT-related training could be delivered through either on-site or distance learning programs, depending on actual demand.

Potential Sources of Investment

Israel

Opportunities to expand the “local” market. The IT training sector in Israel has demonstrated a growing interest in expanding their programs across the Green Line in order to take advantage of the growing interest of Palestinian students in the IT sector. As many of the private IT training programs in Israel are linked to software development and other IT service enterprises, they also have a strong interest in training an accessible but lower-cost labor supply.

One of the first investments into the West Bank to be funded by the Peres Technology Fund went to the Israeli IT training provider Sivan, a subsidiary of Formula Software, one of the largest software houses in Israel. Sivan entered into a joint venture with a local Palestinian company to provide both basic computer skills training and professional certification programs, including Microsoft Certified Systems Engineers and Developers. Instructors will be selected from amongst the leading Palestinian IT professionals, who will be trained by Sivan to deliver all the courses. While the first training center will be located in Ramallah, Sivan expects to open at least three others in the urban centers of the West Bank and the Gaza Strip.

Given the growing interest of Israel-based software developers to access the low-cost labor supply across the Green Line, and the growing demand for IT programs in the West Bank, there is great potential for the KTDC to attract investments in IT training from the leading IT companies in Israel. While there have been no investments to date in business and management-related courses, the growing demand in West Bank/Gaza for training in these areas is likely to spur interest by Israel-based business programs in the future.

International

Growing interest in the Middle East. The growing use of computers and emerging IT industries throughout the Middle East are increasingly capturing the interest of American and European IT companies. However, while there is a growing demand for IT training programs throughout the Middle East, most IT certification programs are offered through local licensed third-party providers. Therefore, direct investment by U.S.- or Europe-based training providers is less likely than investment by Israel-based or local investors (see section below).

There is greater potential for investment in the area of business and management training programs, which are less widespread in the Middle East due to the lack on indigenous expertise. In the West Bank and the Gaza Strip, there are no graduate level or informal programs in management and/or business development. The situation is similar throughout much of the Arab Middle East.

A consortium of leading British universities has already entered to fill this niche market in the Middle East. The Management Development Centre International (MDCI), a private company, provides MBA and other business education programs in collaboration with several British universities, including University of Hull, Lincoln University, and the Chartered Institute of Marketing. MDCI currently has degree programs in Bahrain, United Arab Emirates, Oman, Saudi Arabia, Zambia, Zimbabwe, and the United Kingdom.

The KTDC, with its focus on entrepreneurial development, has a strong potential to attract similar business development training programs from the United States and Europe.

West Bank/Gaza

The fastest growing sector of the Palestinian IT industry. IT training is one of the fastest growth sectors in the Palestinian IT industry, growing at an estimated 15 percent per annum. An increasing number of local companies are engaged in training, typically as a secondary line of business. According to the Ministry of Industry there were 288 IT training sources in 1996. Current estimates put the number in excess of 300.[36] Training programs include both basic IT training (word processing, spreadsheets, etc.) and software development skills (Oracle, C++, Microsoft, Novell).

One of the largest IT training enterprises in West Bank/Gaza is Arab Turnkey Systems (ATS). ATS is an authorized training center for Oracle. ATS initially entered the training field in order to "test" the skills of potential employees. ATS now has 10 Oracle certified developers on staff, who are involved in the company's software development activities, most of which are graduate ATS trainees.

Galaxy Information Systems is another large IT training enterprise, located in Ramallah. Galaxy was established in 1997 and has certified 50 engineers to date. They are a Prometric Testing Center and offer programs in Microsoft and Novell. IT training comprises approximately 30 percent of the company's revenues.

While most local IT training companies are currently located in Ramallah, the KTDC has strong potential to attract local entrepreneurs as demand for new on-site training programs grows. TSG findings indicate that many local companies are hesitant to locate in Tulkarem, far away from the existing Palestinian IT cluster in Ramallah. However, once the KTDC establishes itself as a new and growing center for IT activity in the West Bank, local companies are likely to change their views about the KTDC's "remoteness".

[36] *IT Strategy Status Report.*

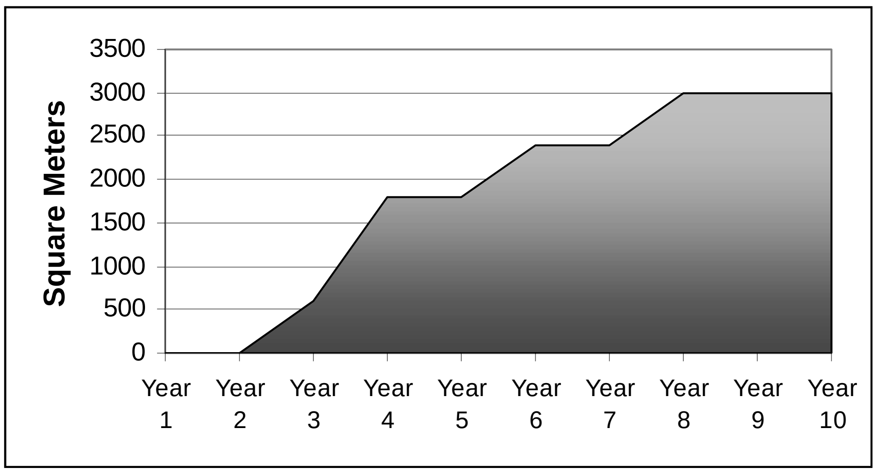
Demand for KTDC Facilities

While publicly-funded training facilities are likely to play a strong role at the KTDC, the park can be expected to attract a limited number of private training facilities offering both IT- and business-related training programs. Investment will be largely driven by local demand.

Demand Forecast

The following figure presents the expected uptake for private investment in on-site training at the KTDC. Projected uptake is derived from an average investment of US$500,000 with 10 employees. Investment figures are based on existing and planned training programs in the West Bank.

Figure 8.7 Private On-Site Training Facilities Uptake



8.7 KTDC Development and Demand Projections

While the previous sections outlined the projected activities and sources of investment in the KTDC, it is expected that their composition in the KTDC's development will change over time. The experience of other technology parks in developing countries – including India and the Caribbean – demonstrate the evolution of park-based industry, from the production of lower-technology products to higher-technology products, from a *low-cost* investment opportunity to a *high-quality* investment opportunity. For instance, the Hsinchu Science-based Industrial Park in Taiwan, in a period of 17 years, evolved from a center for production (mostly hardware and electronics) to an R&D center. By 1997, Hsinchu Park firms were spending 5.4 percent of their sales revenues on R&D, compared to an average of 1 percent for other firms in Taiwan.

It is expected that the KTDC will follow a similar development trajectory, moving from basic IT services in the initial stages of development to more design- and engineering-oriented activities within 10 to 15 years as local skills and industry expertise develop. The KTDC will move from being a low-cost alternative for Israeli firms to an integrated extension of the growing Haifa-Herzlya technology corridor. The projected development of KTDC industry over time provides the basis for establishing the demand projections for KTDC facilities (office, manufacturing, and training space).

- Phase 1 (Years 1 to 5). In the first phase of development, it is projected that investment will be dominated by basic software development activities and IT services, as well as some consumer electronics assembly and repair services. Call center activities, given the low level of existing demand, is expected to emerge more strongly in the second phase of development as regional conditions become more conducive to industry development. Investment will mostly be sourced from Israeli and multinational investors, though many in partnership with local Palestinian companies. Other local entrepreneurs are projected to locate at the KTDC once an initial cluster of Israeli and multinationals have established there. Local entrepreneurs will remain relatively inward-looking. While Israeli and multinational ventures would establish themselves in regular office space, local entrepreneurs, would be likely to locate in either a KTDC incubator program or shared office space, depending on needs, "upgrading" their office space requirements as they grow and gain experience.

- Phase 2 (Years 6 to 10). During the second phase of development, there will be little change in the composition of industry activities, with the exception of the entrance of call center activities. In addition, local entrepreneurs are likely to become more outward-looking, as their capacity to market to the region grows. It will up be to the KTDC's management to ensure that the integrity of the park remains intact, by limiting the entrance of electronics assembly and repair services. The average size of investment is expected to grow over time, across all IT industry sectors, as existing enterprises expand, and more ambitious projects follow on the heels of the initial tenants, both impacting the demand for various KTDC facilities, as incubator tenants "graduate" and local entrepreneurs upgrade their facilities.

- Phase 3 (Years 11 to 20). During the next ten years of the KTDC's development, the composition of industry will begin to change as local industry gains industry experience, providing the opportunity to move from lower-cost, basic services to higher-quality product design and engineering, in both the software and electronics sectors. IT services – including call centers, data entry, and other IT services – will continue to grow as the demand for their services increases. The third phase of development will see a gradual "leveling-off" of investment, as the KTDC nears full capacity.

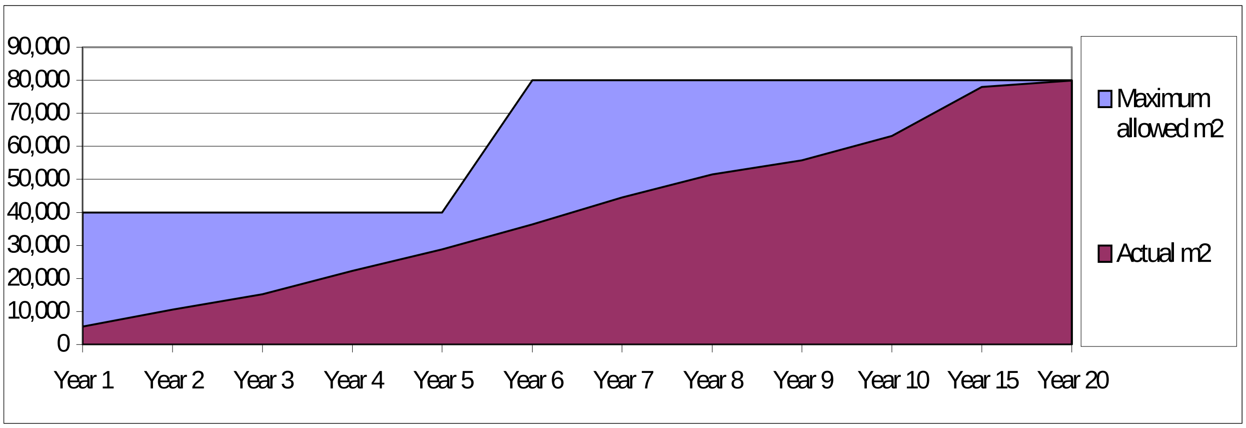
Demand Projections

The following demand projections for the KTDC are based on the foregoing market assessment, as well as empirical evidence of growth patterns in leading technology parks around the world.

Based on worldwide best practices in technology park and industrial estate development, the KTDC should be developed in stages, in alignment with growth in expected demand for park facilities. Given the projected industry growth over time in the KTDC, the KTDC should be developed in two stages. Half of the 20-hectare site should be developed initially, which would accommodate the space requirements of industry in the first five years of its operations. The remaining 10 hectares of land should be developed after year five in order to accommodate the second and third phases of investment demand.

The figure below depicts the upper limit of developable floorspace in each phase of development, as well as the projected uptake of space over time based on the market assessment. Based on empirical evidence on technology park development around the world, floor area ratios (the ratio of floorspace to developed land) are typically in the range of 0.35 and 0.45. The maximum allowable floorspace for the KTDC is based on a floor area ratio of 0.4. Therefore, the maximum allowable floorspace in phase I (year 1 to 5) is 40,000 m2; in phase II (years 6 to 10) and phase III (years 11 to 20), the maximum allowable floorspace is 80,000 m2.

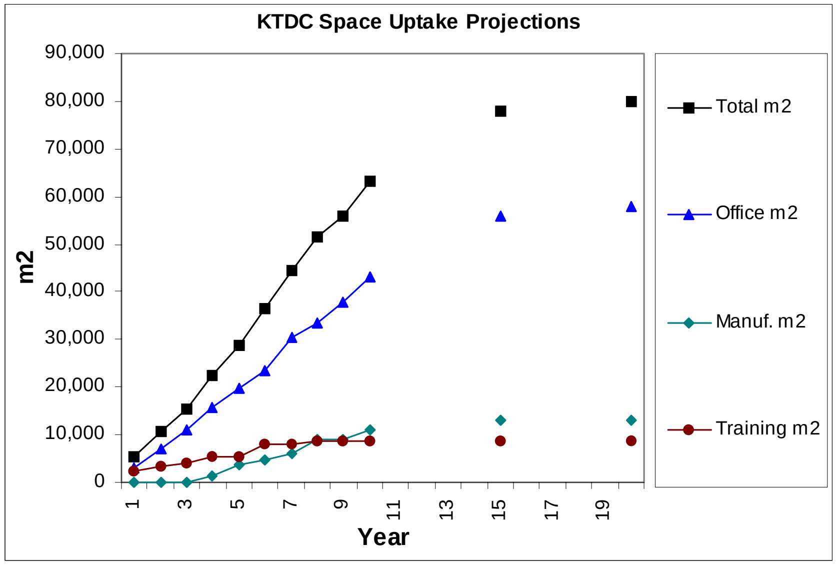
Figure 8.8 KTDC Floorspace Uptake Projections



Note:
Actual m2 = Floorspace developed to meet actual demand by tenants
Uptake percentage = Developed floorspace in each category as a percentage of maximum allowed m2 in each phase of development
Maximum allowed m2 = Upper limit of developable floorspace in each phase, based on a floor area ratio of 0.4, phase I development of 10 ha and phase II development of full 20 ha site

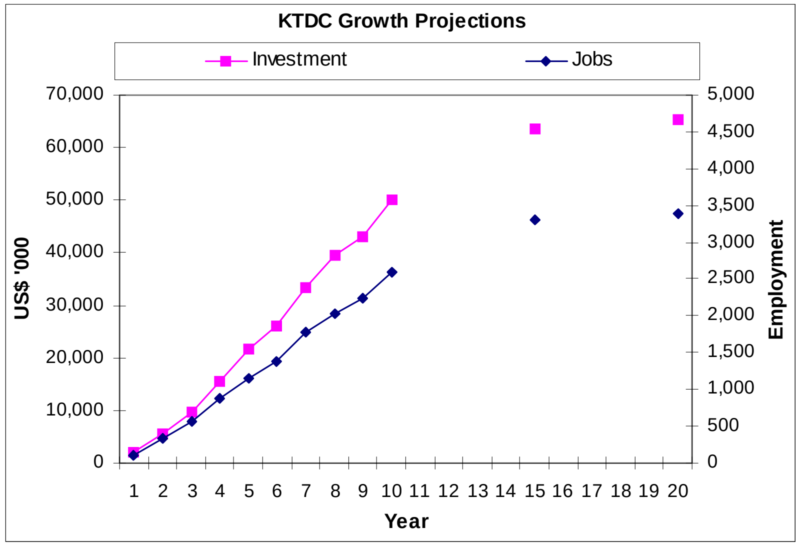
The following figure depicts the projected uptake of space for each type of facility (office space, manufacturing space, and training facilities).

Figure 8.9 KTDC Space Uptake Projections, by Facility Type



The figure on the following page depicts the projected growth in investment and employment at the KTDC over a 20-year period, based on estimates derived from the market assessment. Investment into the KTDC is expected to grow at a relatively fast pace in the first ten years of operations, with investment averaging US$ 5 million per year, after which it is expected to slow down and eventually level-off as the park reaches full capacity.

Figure 8.10 KTDC Investment and Employment Projections[37]



[37] Investment and employment projections include all private-sector generated investment and employment, as well as some public-sector generated investment and employment. The public-sector generated investment and employment included in these estimate include *only* investment and employment in the KTDC incubator, training facilities, and park administrative facilities. Other publicly-funded infrastructure and facilities (water, power, telecommunications, etc.) are *not* included.

9. TDC Product Definition: Policies and Institutions

9.1 The KTDC as "Product"

The potential demand profile for the KTDC described in chapter 8 represents a strong market opportunity for the provision of technology-related space and services at Tulkarem. This potential demand must not, however, be equated with conventional calculations of demand for speculatively developed office space. Successful KTDC development requires not only the installation of a discrete set of physical facilities, but also a complementary introduction of appropriate policies and institutional relationships that define the KTDC.

The KTDC is thus a composite of physical, legal/regulatory, and institutional systems. This composite KTDC "product" offers potential developers and tenants a unique and attractive investment location that consists of both modern facilities and an innovative enabling environment. This identify of the KTDC as an investment location "product" that is aimed at meeting very specific industry demand niches is central to the success of the project.

This chapter describes the central policy and institutional attributes that define the KTDC's enabling environment – the KTDC's "software". The KTDC's "hardware" – the modern physical facilities that are provided by the KTDC – are then described in chapter 10.

9.2 Investment Policies

Countries commonly implement national, regional, or enterprise-or zone-specific investment policies and incentives to influence investment location decisions made by private sector investors. These incentives include a wide range of explicit and implicit subsidies that differ in the degree to which they distort market mechanisms and in the costs (administrative and foregone revenue) they impose on the governments who design them.

Some form of investment incentives are almost always a feature of technology parks and technology centers. These technology-oriented investment locations are generally seen as initiatives with strong public policy components aimed at achieving public goals (economic diversification, technology transfer, human resources development, technology diffusion, etc.) that warrant public investment to capture public benefits. While the extend to which these implicit and explicit subsidies actually produce positive economic returns differs widely from case to case, the anticipation of capturing public benefits is generally perceived as one of the primary reasons for supporting technology parks through special incentive systems.

Implementing these incentives is achieved through reducing the cost of business at the target location relative to other sites, and by increasing the recipient businesses' after-tax net revenues. These incentives generally fall under one of six categories, which are listed in table 9.1:

Table 9.1: Investment Incentive Categories

General category	Specific types (examples)
Land-related	Below-market land rent or cost Below-market mortgage rates and loans
Service-related	Free or discounted installation of infrastructure and utilities (communications, telecommunications, access roads) Free or discounted utility rates
Worker-related	Free or subsidized worker training On-site recruitment and processing Scholarships and inducements to repatriate
Tax incentives	National/regional/local income tax holidays/credits/deductions for specific activities: • Investment in M&E • Employment • R&D • Development of special facilities or equipment Accelerated depreciation provisions Sales tax exemptions Property tax abatements Free trade status
General financial incentives	Low-interest loans Subsidies
Regulatory incentives	Expedited review of planning and compliance documents Density bonuses Relaxation of standards (i.e. prohibiting strikes and lockouts)

It is important to note that incentives afforded by technology parks are not always equal to incentives enjoyed by park tenants. In most cases, park-specific incentives overlap with national-level investment incentives, so that park incentives apply on the margin, where national incentives leave off. The competitiveness of park regimes thus depends in turn on the competitiveness of the national regime – the more uncompetitive the national regime is, the greater the need to implement park-specific incentives if the technology park is to be implemented successfully.

Land-related

Privately owned projects often must yield positive returns within a few years to attract capital. This is achieved through the market pricing of land and value-added of land development. Most publicly owned properties are not subject to that same requirement, and can use the pricing of land and setting of rent levels as a major inducement to businesses. The public control of land thus has two consequences: First, it can restrict land use to activities that provide a high level of public benefit – for example, by zoning land for R&D and institutional use rather than high density commercial, industrial, or residential. Second, it can stretch out the payback period over which the public investment's returns are evaluated. Even if the public owner requires a positive yield on the land (using the market value as the base), land prices or lease rates can be set to achieve break-even in 20 or 30 years, rather than the shorter periods (say 5 years) required by private investors.

The financial implications of these land-based incentives can be dramatic. For a $10,000,000 investment to be repaid in 5 years, at 10 percent before taxes, revenues must reach $212,500 per month. The same investment repaid over 25 years would require revenues of $91,000 per month. Even without an explicit subsidy, each square meter of space could be rented for 43 percent of the equivalent private space. If the public owner now decides to subsidize the project by requiring investment returns below fair market value, land prices and lease rates are lowered even further.

One of the best-known technology parks in the U.S. – the Stanford Research Park – pioneered the use of favorable rent policies when it opened in the early 1950s. It granted 50-year leases to companies, with annual escalators that kept charges below market rates. The companies were able to build their facilities with complete certainty about their future land costs. Now, the park is a success and its sites are in high demand. As the initial leases expire and the park is established, the land pricing strategy is being re-oriented towards shorter, more market-oriented rates.

Infrastructure/service related

Many parks provide utility hook-ups, access to telecommunications networks, and road access with low or no charge to businesses. When that infrastructure is provided with government or donor organization funds, this represents a subsidy to companies that otherwise would incur those costs themselves. Even when there is no or little subsidy, the costs for infrastructure installation in a technology park can be favorable due to economies of scale. These economies of scale and agglomeration that can be exploited by a central developer are one of the main reasons for all kinds of physically delimited industrial estate development.

Some parks also 1) provide potable water, wastewater treatment, solid waste, and/or electricity themselves and sell those services at favorable rates, or 2) broker bulk service contracts between park tenants and outside utilities on favorable terms.

Worker-related

Especially in technology-intensive activities, businesses face high costs finding, processing, and employing appropriately trained workers, and in ensuring that the skills and knowledge of prospective and employed workers are up to date. Park management, therefore, often provides two sorts of services to reduce businesses costs: 1) centralized human resources services, and 2) subsidized worker training and education programs.

Centralized human resources activities exploit “localization economies,” or the sharing of a common labor pool by similar businesses – an economy of scale effect similar to those in shared infrastructure provision. A central processing operation recruits, receives, and processes workers interested in employment in any of the park’s facilities, thereby eliminating the need for duplicated manpower search activities by individual companies. The centralized office can check references, administer aptitude tests, process paperwork, and either hire workers on behalf of client firms or send prospects for final interviews. This activity is easily privatized over time. For-profit human resources companies are often a rent-paying tenant of the park, and can charge park companies for the services they provide.

Private companies or technical colleges and universities can also be involved in worker education and training activities, either subsidized or at market rates. A well-known and widespread use of government-financed training is the “customized job training” initiative in North Carolina. Under this program, businesses are offered highly subsidized workforce training in the skills that will be required on the shop floor. The training is designed by the company and the nearby technical college, and conducted by the technical college’s staff. A related set of incentives are aimed directly at workers rather than companies. For example, some less-developed countries provide scholarships for study abroad, provided that the recipient returns for a specified minimum time period. Some countries also provide financial incentives for expatriate entrepreneurs to return.

Tax incentives

Tax incentives are important to businesses both for symbolic and economic reasons. They tend to signal a willingness by government to make concessions to businesses, or create what is commonly called a favorable “business climate.” Studies of the use of business tax incentives in the U.S. verify this symbolic importance: It has been documented that the same companies who attest to the importance of tax incentives in surveys often do not take advantage of them once they actually implement and investment project.

The value of a given tax benefits depends on the structure of the incentive and the type of activities in which the taxpayer engages. The benefits generally are of three types: deductions, credits, and exemptions.

Deductions reduce the amount of taxable income subject to the statutory rate. They include, for example, dollar-for-dollar or fractional deductions for the cost of qualified plant and equipment. The value of the deduction to the firm depends on the tax rate, since every dollar of deduction saves the firm that amount at the effective tax rate.

Tax deductions also include accelerated depreciation allowances, which permit taxpayers to write off the value of plant and equipment faster than physical wear and tear would suggest. The logic of a depreciation allowance is to permit the taxpayer to have recovered the value of a depreciable asset in tax savings, by the end of its useful life, to provide adequate liquidity for replacement. Clearly, the taxpayer benefits most in present value terms if an outlay is expensed (taken in the first year). Various accelerated depreciation schemes allow write-offs somewhere between expensing and the real useful life. Accelerated depreciation schemes tend to be complicated and costly to administer.

Tax credits are dollar-for-dollar reductions in tax liability, calculated "below-the-line" or after tax deductions are taken into account. The relative trade-off depends on the effective tax rate and the percent of expenditures subject to the deduction and credit. The value to the firm of deductions and credits also depends on carryover provisions. In the case that either wipes out a firm's taxable income, there are two choices: make the incentives refundable or allow unused incentives to be carried forward or back to other tax years.

A third type of tax incentive is to exempt a taxpayer from some or all taxes altogether - sometimes called a "tax holiday." At the local level (where property taxes are typically assessed), this amounts to a property tax abatement. It can also eliminate payments of sales or excise taxes on some or all goods (used as part of free trade incentives, to create tax free zones), and income taxes.

Other Financial Incentives

The limitation of tax incentives is that they are only valuable to the firm to the extent there is a tax liability to offset. Tax incentives also potentially distort the recipients' production choices (use of factors, types of inputs, etc.) in unintended ways. Another approach is simply to provide firms with grants and other subsidies to be used however the business chooses. This may include loans with favorable repayment terms.

Regulatory Relief

One valuable function performed by technology parks is the provision of one-stop shopping for regulatory clearances and other approvals. Businesses wanting to build in the park can be offered assistance in obtaining environmental and building permits and professional certifications (including ISO and other ministerial approvals). While one-stop shopping is often cited as a necessary tool for park development in developing countries burdened by excessive bureaucracy, the same approach is sued in many developed countries. The U.S. has developed enterprise zones as a model for this approach, and eco-industrial parks, most notable the one in Kalundborg, Denmark, are based on one-stop approvals in the environmental area.

Incentive Examples

Different combinations of incentive tools and mechanisms are often implemented to achieve specific goals, with varying degrees of success. For example, the six technology parks profiles in chapter 2 all offer their own incentive schemes.

Hsinchu Science Park, Taiwan. Organizations in the park are linked to a broadband network from which they can access automated customs clearance, and do electronic data transfers, water resource management, human resource recruitment with the park administration, and vehicle registration. The net provides all businesses access to law and regulatory information, libraries, statistical data, and other information on the worldwide web. It allows multi-point video conferencing and distance learning. The government has invested approximately $600 million for roads, other infrastructure, and amenities. The government also built the state-of-the-art National Experimental High School in the park, as a way to attract knowledge workers who value first-rate education for their children. Park administration also awards over $4 million annually for innovative R&D projects, and recognizes successful projects with awards. Similarly, the park administration awards approximately $13 million each year to park organizations as a local match to develop strategic products and components (almost 40 percent of the value of those projects).

Aegean Free Zone Technopark, Turkey. The Technopark has the attributes of a typical free trade zone, with customs deferral during processing, ample warehouse space, and proximity to transport nodes. The Turkish government also offers a 100 percent tax holiday on corporate earnings and on interest from savings held in zone banks. The government also prohibits strikes and lockouts in the zone.

National Science and Technology Development Agency Science Park, Thailand. One model program, begun by the government well before NSTDA was established, sends promising young scholars abroad for Ph.D.s, with the stipulation they return to Thailand afterwards. A follow-up program supports new graduate degree holders at Thai universities, to conduct research. In 1996, the Thai government began the “Reverse Brain Drain Project,” using financial incentives to lure back to Thailand expatriate professionals living in North America, Japan, and Europe. NSTDA also uses the two nearby universities to provide courses and training programs. NSTDA charges less than market rental rates. It also exempts import duties on machinery, equipment, and raw materials; an eight-year corporate income tax holiday; a 200 percent tax deduction for R&D expenses; and assistance obtaining visas for foreign technicians and their families.

Shenzhen High-Tech Industrial Park, China. The services and incentives being offered include a fiber optic network for internet and other telecommunication needs; a full two year and 50 percent eight year income tax exemption for certified high-tech enterprises; an 80 percent reduction in VAT paid by software firms in the region; a 10 percent R&D bonus paid to integrated circuit, PLC switches, software, and computer companies; personal tax exemption to employees who reinvest their profit distributions in the company; and a 5 year property tax abatement. The park also offers relatively low rental rates, since the government does not price land at market value.

Technopark Kerala, India. Businesses in the park receive expedited development approvals. The state grants tenants businesses exemptions from the Pollution Control Act and state sales taxes, for seven years; priority in the distribution of electric power; and a subsidy for capital investment of 20 percent, up to a ceiling of about $60,000.

Kulim High Tech Park, Malaysia. Qualified firms receive a full 5-10 year tax exemption or an investment tax allowance of 60-100 percent on qualifying capital expenditure for five years (depending on the type of project), to offset up to 100 percent of statutory income for each assessment year, with a carry forward of unutilized allowances; assistance in obtaining visas for foreign scientists or highly skilled personnel; approval to open foreign exchange accounts; double tax deduction on expenditures incurred in approved research projects; research allowance of 50 percent on qualifying R&D expenditures for 10 years (based on 70 percent of statutory income level); Industrial Building Allowance for buildings used for R&D and technical/vocational training; exemption on import duties and sales tax on equipment used in R&D; lower water rates for any amount of water used for the first three years of operation; assessment rates of only 8 percent for the first three years of operation; an investment tax allowance of 100 percent for ten years for companies providing technical or vocational training, up to 70 percent of tax liability; and an exemption from import duties, sales taxes, and excise duties on machinery/equipment, materials, raw materials and samples used for purpose of training, for companies that provide technical or vocational training.

Clearly, these incentive regimes differ widely. Some of this reflects each technology park's vision and purpose: Some have a general development focus, and offer incentives across industries. Others follow from a very tightly focused development strategy, and subsequently tailor their incentives towards specific industries and niches. While some countries offer liberal investment environments that are marginally improved by park-specific incentives, others are burdened by restrictive national policies that must be addressed in the context of the park itself (for example, free access to foreign exchange for park tenants).

KTDC Incentives

The incentive structure applied to the KTDC must similarly be tailored to both the objectives of the park and to the existing constraints in the Palestinian economy. In addition, some incentives may be vital to the success of the KTDC, while others represent supporting initiatives that would help the KTDC develop over time, but are not necessary conditions for its success. The components of the KTDC incentive system are discussed individually below.

Land-related. The land allocation system within the KTDC follows a master plan that restricts uses based on investment compatibility with the KTDC's mission as a technology park. This land is to be developed as much as possible along market-based principles. The main mechanism for land-based subsidization is the valuation of the KTDC land that is currently owned by the PA, and the mark-up on the cost of that land as it is released to the developer. This mechanism is described in more detail in the financial model.

Specific rental subsidies are envisioned only for the multi-tenant workspace – at a reduced level of 75 percent of market rental rates. Access to this subsidized rental rate is determined through entry criteria for the multi-tenant workspace, which is allocated through fixed term rental agreements.

Infrastructure/service-related. The most important infrastructure incentive that can be provided to KTDC tenants consists of 1) a state-of-the-art fiber optic telecommunications backbone within the KTDC, and 2) a dedicated KTDC satellite earth station that allows KTDC tenants access to low-cost, high-speed telecommunications services. More important than subsidization of this telecommunications infrastructure will be the introduction of a liberalized regulatory regime that allows for the implementation of this dedicated telecommunications facility in the Palestinian context, outside the existing PalTel monopoly. While PalTel could be a partner in the development of the facility, it should not be governed by the same restrictive regulatory and pricing framework that operates in the rest of West Bank/Gaza. The real “incentive” is thus not the subsidization of existing utilities, but rather the introduction in the KTDC of new, high-quality telecommunications services. The KTDC will not, of course, compete with PalTel by on-selling telecommunications services into the rest of West Bank/Gaza. Implementing this incentive within the KTDC is not, however, a purely Palestinian decision – Israeli regulatory approval will be required for licensing and commissioning a new earth station.

The KTDC will also provide modern water/wastewater treatment and a reliable electricity supply. Again, reliability and quality of service is the real incentive here, not subsidization of rates. However, provision of electricity should not occur though the Tulkarem municipal net (and thus avoid municipal surcharges). Where new water/wastewater treatment investments result in positive externalities for the Tulkarem region, those benefits provided by the KTDC should be reflected in lower usage rates.

Worker-related. The KTDC is based on the assumption that a technology park at Tulkarem is an appropriate location from which to link Palestinian knowledge workers with regional and international technology industries. It the KTDC is to succeed, this model must employ not only the employment of existing skilled Palestinians, but also the training of future knowledge workers.

The KTDC will serve as a platform for a number of training activities, many of which will be implemented on a fee-for-service basis. The main training “subsidy” will consist of university training held by Palestinian universities at the KTDC training facility. In addition, the KTDC will provide subsidized human resources placement services through the labor market information system, which is described in more detail below.

One human resource development incentive that should be considered at the national level rather than as part of the KTDC is a system of scholarships for university students to study abroad in specified subject areas, with the stipulation that they return to West Bank/Gaza for some period of time upon graduation.

Tax incentives. The KTDC is designed to fall under the national tax regime. The only tax incentive applicable to the KTDC will be national investment incentives and the additional incentives available under the industrial estates regime.

At the national level, West Bank/Gaza should conclude double taxation agreements with Israel, the U.S. and Europe in order to assure that Palestinian incentives actually represent a real benefit to foreign investors. In addition, a targeted R&D incentive system (for example, one that provides tax credits for R&D activities subcontracted to universities) should be considered at the national level.

Regulatory. KTDC tenants will benefit from one-stop investment and regulatory approvals, in coordination with PIEFZA. In addition, the KTDC should receive special regulatory status for telecommunications provision, as described above.

One central feature of the Palestinian economy that is not a factor in the other technology parks that have been examined is the complex system for moving workers and goods across the green line. The impact of this system of permits, inspections, and closures is described in more detail in chapter 5.

A key aspect of the KTDC is thus the ability to negotiate special status for KTDC tenants and workers with the Israeli authorities to “closure-proof” the park, and to liberalize the movement of managers and workers across the green line. This is required to accommodate:

- Access to the KTDC for managers and technicians who reside in Israel

- Managers who reside in West Bank/Gaza but oversee activities on both sides of the green line

- Movement of trainers, technicians, and workers to participate in training activities and collaborative site visits in both sides of the green line

9.3 Human Resources

If the KTDC is to develop successfully over time, it must play an active part in developing West Bank/Gaza's technological skills base. These human resources development activities will be centered around a modern and well-equipped training and conferencing facility that serves both KTDC tenants and the broader Palestinian economy. This training center will attract IT experts to the area, answer questions about employment needs and educational opportunities, fill gaps in the provision of IT education and training, serve as an incentive to attract IT related businesses, and serve as a significant resource to the industry as it grows. The Center will accommodate five main types of activities:

1. Targeted and certified educational training for employees in IT occupations

- Deliver or support direct for training new employees, either on-site or at the company
- Offer vendors a central location for certified training
- Provide a central location for distance learning and a library of available courses and programs
- Offer seminars and workshops in new technologies
- Fill gaps by offering courses not available in universities

2. Management education in use of IT for e-commerce

- Provide advanced internet access site for teaching Palestinian businesses about e-commerce and e-business
- Provide a location for teleconferencing

3. Upgrading skills of teachers and faculty (IT instructors)

- Hold in-service training workshops in latest technologies and pedagogies
- Inform instructors about innovations, curriculum, and materials available elsewhere

4. Serving as source of labor market information and human resource development-related R&D

- Conduct IT-related R&D such as, i.e. instructional methods, skill needs surveys, students assessment instruments, curriculum development, and new program design

- Collect and disseminate labor market information that can be used by industry, students, and school guidance counselors, and instructors
- Create a means for using the expertise of faculty and students for IT-related and -sponsored R&D, similar to Germany's college-based Fraunhofer Institutes

5. Linking Academia to industry
- Create industry learning experiences and internships for students and instructors
- Organize industry to cooperate on planning, curriculum development, and assessments.
- Organize skills alliances among companies

Similar activities have been implemented in technology parks around the world, under a variety of structures. Successful initiatives tend to be the ones that:

- Are market driven, with an industry-dominated advisory council recommending equipment purchases, courses offerings and content, and standards
- Are inclusive, with planning for and governance of the Center shared with representatives from the private sector (including telecom companies, multi-nationals, and IT industry associations) and tertiary educational institutions
- Focus on developing clusters, building expertise, and targeting resources rather than trying to meet the needs of all firms
- Do not conduct programs on-site that directly compete with education and training programs at existing institutions, but rather offer programs that complement and enhance existing curricula and continuing education
- Draw on resources and expertise from many sources in and outside of their home region
- Play a brokering role for business alliances to support training and access to information and resources
- Market and promote the capabilities of the work force to support inward investment
- Serve as a catalyst for innovation and improvement within the larger education establishment
- Have a very strong director with both industry and education/training experience

KTDC and the Education and Training System

The training center is designed to supplement and enhance the IT skills of the work force, not to become the sole source of education and training. The proposed training center must work in concert with the entire system of schools, colleges and universities to be effective – ultimately, success will be tightly linked to the quality of West Bank/Gaza's education and training system. Development of the KTDC and the Palestinian technology-based industry will require significant investments in human resources at all levels of education, and for the incumbent work force as well as for those re-entering the labor force.

Different technology workers require different sets of skills and levels of education. For example, in the U.S., one-third of core IT workers do not have a college degree. A high school diploma may be sufficient for data entry or selected basic electronics technician positions, an associate degree prepares workers for IT maintenance jobs, a bachelor's or master's' degree for programming, systems analysis, or engineering, and a Ph.D. for creating new Information technologies. A recent study of the industry suggests that the associate and master's degrees are most important to the supply of IT workers because they are more vocationally oriented than bachelors or doctoral degrees.[1] Key elements of educational reform in West Bank/Gaza include:

- Reforming teaching in the basic and secondary academic education system (the IT industry is an industry of young people—in the U.S., 80 percent are under 45—and West Bank/Gaza is a young population with great potential)
- Establishing a more efficient labor market information system
- Making the secondary vocational and tertiary systems more flexible, relevant, and connected to the IT industry
- Generating interest in the fields among high-achieving students

1. Reform of Basic and Secondary Education. Public education reform is a key factor in the success of any IT strategy. The basic and secondary systems have been thoroughly studied, and the World Bank has made a set of excellent recommendations, mainly

[1] Peter Freeman and William Aspray. 1999. The Supply of Information Technology Workers in the United States. Washington, DC: Computing Research Association.

related to improving instruction. For the IT sectors, among the highest priorities are providing:

- Incentives for teachers to upgrade their skills and to innovate
- In-service training in up-to-date computer labs
- Students with earlier exposure to IT career opportunities
- Allowing teachers to acquire industry-based IT experience

In addition, major challenges for secondary education that have not yet been fully addressed include:

- Upgrading the status and image of vocational education by opening routes to higher education
- Modernizing facilities and equipment
- More fully integrating the technical programs with the academic programs (i.e. using applications to teach theory)
- Expand access to modules that build IT competencies into occupational paths

2. Improvement and Expansion of Tertiary Education. Tertiary education includes both the community and technical college system and universities. The former is a critical and often underutilized part of the IT human resource system. The two-year colleges in other parts of the world are the route to lifelong learning and most common source of continuing education for adults. In the U.S., it is quite common for adults with bachelors' degrees to enroll in community colleges to acquire new skills and even associate degrees. In some regions, one in four community/technical students already has a bachelors' degree. Since most IT workers were educated in non-IT fields,[2] community colleges offer a place for people to take courses to supplement their knowledge to enable them to qualify as IT workers. In the U.S., community colleges have been the most common host institutions for industry certification programs, industry training, and customized training for new and expanding industry. They are generally the most responsive to local economies.

Flexibility is one of the most common high-tech company requirements. Technical colleges, like the secondary vocational

[2] Ann Meares and John F. Sargent, Jr. 1999. The Digital Work Force: Building Infotech Skills at the Speed of Innovation. Washington, DC: U.S. Department of Commerce, Office of Technology Policy, June 1999.

schools, are relying heavily on achieving flexibility by incorporating a system similar to the modular competency-based structure used in Scotland. But flexibility ought to apply to the work force as well as to educational programs. This is achieved by exposing students to the full scope of an industry and giving them real business problems that integrate skills across a range of positions in a company in ways that take into account the generic skills and capabilities sought by employers. This is best done in cooperation with industry so that the problems posed to students are real and relevant. Such a reform was suggested by the Ministry of Education last year. One suggestion is for industry to provide a final "problem" with which to test graduates, as suggested in the proposed Hijjawi College.

One way to improve the ability of faculty to improve and innovate is to establish a structure for them to learn from each other and from others outside West Bank/Gaza. A recent landmark study of community college teaching in the U.S.[3] found that most innovative practices seem to emerge from collective efforts, not from individual instructors. Palestinian colleges and universities could benefit from closer alliances and faculty exchanges with peers at similar institutions of higher education in other places by participating in conferences, establishing long-term alliances, and engaging in exchange programs. These information sharing and technology mechanisms promote learning and innovation. The technical college at Tulkarem, for example, could become a member of the Trans-Atlantic Technology and Training Alliance.

3. Develop Labor Market Systems. A key ingredient for a successful KTDC development strategy is an effective labor market information system. At all levels, better labor market systems are needed to

- Ensure that the skills being taught are relevant to labor market needs
- Provide opportunities for workplace experience
- Improve employment and further education opportunities for graduates

[3] W. Norton Grubb and Associates. 1999. Honored but Invisible: An Inside Look at Teaching in Community Colleges, London: Routledge.

At a minimum, each major industry sector ought to have a workforce development council that regularly surveys industry needs, monitors industry standards, and meets and reviews educational programs and policies. The PA's reference paper suggests "social partners could play the major role in a permanent labour market monitoring system." Given the growing importance of IT skills in all industries, the IT workforce development council should be staffed and located in an office at the KTDC training center.

4. Connect to Industry. Perhaps the most common criticism of higher education (from both outside and inside the system) is the absence of formal or regular informal relationships with industry. Social partnerships require organizations that can represent the interests of the partners, such as business and trade associations. These partnership serve many functions: setting standards, helping to acquire information from industry, qualifying graduates, ensuring that content is relevant to emerging labor market needs, and providing learning experiences for students and faculty.

One of the most important functions of the social partners is to establish qualifications and set skill and quality standards for key industries. This is best accomplished on an industry-by-industry basis, with, for example, the IT industry establishing its own requirements for graduation. Greater participation of local industry on institutions' governing boards and sector-specific industry advisory boards should be required for accreditation of occupational programs.

Work experience is considered a vital element of strong educational system. Although most Palestinian students are required to work in industry, the experience is extra-curricular rather than intra-curricular, and there are no structures for incorporating work experience into the learning process. Rarely are students paid or awarded credits toward graduation. This is quite different than a program in which the work experience is related to the course of study, formalized, and integrated into the curriculum, which gives the graduates work experience before graduation. Such a program would also better connect both students and faculty to labor markets and, in situations where the schools are more advanced than the companies, help introduce new methods into Palestinian firms.

The KTDC as a Source of Education/Training Reform

While all of these issues should be addressed in the broader context of education and training reform in West Bank/Gaza, the KTDC training center can make very specific contributions towards human resources development that meet both the requirements of KTDC tenants and the broader Palestinian economy. This is achieved through the following functions and services of the KTDC training center:

- Selected for-credit, non-credit continuing education, and special certification courses that individual institutions are unable to offer
- Entrepreneurial education and training and advice for small and potential IT businesses (in conjunction with the multi-tenant workspace)
- A repository of information about labor market, the state of technology in the industry, and educational opportunities (particularly distance learning)

- Stimulation and support for educational structural and curricular reform
- A site for conferences and symposia intended to upgrade skills and knowledge about the industry and technology
- Research on assessments and improvements to IT education and training
- Marketing and promoting information

1. Credit and Non-Credit Education and Training. The core task for the training center is education and training, complementing programs that are offered by existing institutions. The value of the training center to credit programs lies in its

Box 9.1: WIFI: The Training Arm of the Austrian Institute for Promotion of the Economy

Both vocational education and incumbent worker training are managed by the Institute for Economic Development of the Austrian Federal Economic Chamber, which every employer is required by law to join. The roles for WIFIs include:

- Developing people and companies through training
- Supporting the factors that create a free market economy climate
- Strengthening the performance potential and competitiveness of companies
- Shaping and influencing markets
- Helping to overcome structural changes in the economy

Their target populations are active skilled workers between the ages of 18 and 35 seeking promotion, future business men and women, human resource and training staff, and management. Because they are responsible to, and effectively belong to, their customers, the businesses that use them have full confidence in their capabilities.

The name “WIFI” is now well known among all Austrians. Recent polls show 91 percent name recognition—not surprising since one out of every seven Austrian adults participated in a WIFI course at least once. Participants paid fees based on length of their programs, which ranged from one-day seminars (8 hours) to six semester courses (1,600 hours). Most courses lead to a WIFI diploma, which is universally accepted by employers.

Participants in WIFIs’ programs include the unemployed, apprentices, skilled workers, clerical workers, engineers, managers, young entrepreneurs, computer scientists, and even youth preparing for the Job Olympics. But the primary customers are from the incumbent work force, with only about 3-4 percent being unemployed.

The success of the WIFIs in Austria is attributable to its acceptance by employers and workers and economic value given to its credentials. They award about 35,000 credentials per year (the population of Austria is about 8 million). Skill upgrading and retraining are considered not just desirable but necessary. Despite the fact that there are other private suppliers of the same services they offer and not inexpensive, the WIFIs are growing the most rapidly and offer the widest range of courses.

economies of scale and collective efficiencies. The center can offer short courses that (a) require specialized resources too costly to be maintained by an existing school or (b) for which there are too few students at an individual campus.

Perhaps the most important opportunity for the KTDC training center lies in non-credit programs. Companies interviewed overwhelmingly seek people with specialized experience rather than new graduates. IT workers are expected to continually acquire special skills and knowledge. Austria's WIFIs, operated by the national Chamber of Commerce, is an excellent model of demand-driven non-credit training. These non-credit programs can include:

- Short courses to upgrade skills of those already employed in the industry
- Certifiable skills required by certain IT companies (i.e. Microsoft and Cisco)
- Customized training for new firms
- Skills to apply IT to other industries (i.e. e-commerce)
- Entry-level skills for those wishing to change careers or re-enter the work force
- Short seminars on new trends, new programs, new equipment, etc.

One important function will be to provide a central location for private vendors or training companies to offer seminars and courses. This is especially vital in certification training – Microsoft, for example, has moved from training 30,000 technical professionals in 1994 to training 1.2 million in 1999 through 1,900 independent training/certification companies around the world. As business operations shift to the web, a related function will be to educate non-IT businesses in the use of IT in, for example, e-commerce, designing and using web sites, using teleconferencing, and converting administrative system to computers.

2. Customized New Employee Training. While less important in IT service industries than in manufacturing, there is some need for customized training for new employees. Such new worker training programs should be developed and piloted at the training, with staff responsible for launching new training, developing assessment instruments, and collecting data on these programs. They may be responsible for the development of the programs, or "customize" the foundation program to meet the particular needs of individual employers who are hiring large numbers of people.

3. Entrepreneurial Education and Training. Given the strong entrepreneurial culture demonstrated by the large proportion of graduates starting new businesses and given the entrepreneurial opportunities within the IT industry, the training center should offer a set of courses aimed at new entrepreneurs and start-up enterprises.

4. Catalyst for Educational Reform and Technological Change. Given the many educational reforms already underway in West Bank/Gaza, the IT training center can also serve as a:

- Test-bed for innovations in education and training
- Partner in educational reforms, particularly with respect to building relationships with the private sector
- Source of on-going information about the skill needs of industry

For example, the training center could be a place to develop new teaching methods that shift away from skill-based teaching to system-based teaching in order to improve problem solving skills and flexibility. It could offer short courses to upgrade the skills of teachers to use new technologies in the classroom and to understand their applications and uses in industry – thus integrating problems and assignments drawn from real industry experiences into their teaching.

As a central site for IT training, the IT Center could also become a stimulus for innovation and improvement within industry. One such successful model for innovation is Germany's Society, an independent networks of 48 applied research centers that draw on the expertise of educational institutions to conduct industry R&D and provide technical assistance. The knowledge gained in the faculty interactions with industry are transferred back to the educational system and integrated into the curricula. A rotating group of "Scientist-in-Residence" drawn from among Palestinians and others working or teaching in IT fields in other places could become a core resource for such a Center.

5. Collection and Dissemination of Information and Knowledge. The training center can be the central source of information about labor markets, industry trends, and technological advances. It should house a Labor Market Information Office that tracks and coordinates labor market information about information technologies, regularly scans global trends and surveys, analyzes and reports on local skill and labor market requirements, and helps incoming IT businesses to find employees. By monitoring and critiquing educational opportunities for distance learning, international exchanges, and work place learning, and by collecting information, evaluations, and comparisons of college and industry programs and courses and workplace learning, it can become a repository for best practices and a source of inspiration for teachers.

Although there is a wealth of information available about IT skills, it is difficult for individual companies or educational institutions to learn about it and assess its value. Simply maintaining a web site or listserv that summarizes and makes local companies aware of pertinent new information would be extremely valuable and help quickly develop a constituency. Important types of information to maintain include:

Box 9.2: Fraunhofer Gesellschaft (FhG)

The Fraunhofer Gesellschaft (FhG) was established in 1948 to revitalize the German economy by promoting practical research. The FhG is the best known element of Germany's technology diffusion system and is widely emulated throughout the world. There are now 47 FhG's in Germany at 32 locations operating as private, non-profit companies and employing more than 8,000 staff, one third of whom are scientists and engineers. Institutes are generally located on campuses and run by university faculty and students. Each FhG must earn half of its income from industry or lose its national funding. The FhG's activities are:

- Joint pre-competitive research
- Bilateral applied research agreements with a single firm
- Subcontract manufacturing for local firms
- Testing and pre-production
- Cooperative arrangements with companies

The Institute for Production Technology (IPT) in Aachen, NorthRhineland-Westphalia, is a typical center. Its budget allocates 47% for industrial research, 31% from government-sponsored research, and 22% for basic research, although much of the 47% from industry is actually a transfer of government money given to the companies. Projects at most FhGs are managed by graduate students under the supervision of professors, and are, therefore, priced slightly below the rates of private consultants but not below equivalent services from other university centers.

Knowledge of Training Processes: The development of good IT training programs begins with some knowledge of curriculum development and educational theory. Center staff should be able to understand the training process well enough to advise companies and schools on the distinguishing factors in the development of training programs. Center leadership should remain current in adult education theory and practical activities of successful training packages.

Use of Training Technologies: In the design of any major training program, there is always a need to understand how the relevant training technologies might apply to the specific training needs articulated. When does distance learning become a potential strategy? What are its advantages and disadvantages? What will be the cost to implement? Who are potential vendors technology, and what prices are generally charged for these services? The Center will serve as a source of this information for the entire Territory.

Best Practices in Training: All major firms are faced with training challenges. How they resolve issues can be a good learning experience for Palestinian employers. One set of activities under the role of systems integrator is for the training center to be aware of benchmark programs, to participate in benchmarking activities with firms, and to continually examine the issue of how training is related to higher productivity and organizational effectiveness. In a sense, the Center becomes a place that collects data to realize effective and efficient training for all firms in the region.

As an information repository, the Center should quickly become an active member of the World Information Technology and Services Alliance and participate in its activities. Part of this information disseminating function would be to establish the social infrastructure for the industry, as offices for and sites where any software or IT associations can meet and hold events.

One model for ensuring that education programs are preparing youth for future requirements is to establish a “Skills Panel” consisting of some of the most advanced IT companies, which represent the future needs of the average firms and that are willing to allow the government access in order to track job requirements. Information from these benchmark companies, not mass surveys, ought to be used to design curriculum for the future.

6. Establish IT Skills Alliances. Small and mid-sized enterprises typically under-invest in education and training because (a) unit costs are too high, (b) the management lacks the time, and (c) fear of losing the investment if the employee transfers to another company. One solution to the first two hurdles is to form education and training networks of companies with similar skill needs and customizing training programs to their common needs. The fear of not capturing the benefits will only be allayed through trust, which develops over time among companies that find ways to collaborate. One function of the training center will be to help the companies form skills or training alliances among IT firms to increase their ability and willingness to invest in training.

9.4 Institutional Framework

Implementing the policy regime and human resources development framework described above in a way that supports private investment in the KTDC requires an institutional oversight framework that supports flexible, market-driven, and results-oriented implementation of the KTDC. This framework should:

- **Reflect a strong political commitment** by the PA to fully implement the KTDC, including its private sector infrastructure provision and cross-border economic integration
- **Grant operational autonomy and flexibility to the KTDC Administration** to allow for responsive management, decision making, and park planning
- **Prioritize inter-agency coordination** to harness the potential complementarities between public and private investment activities
- **Maximize the role of the private sector** in the development of the KTDC to ensure an efficient allocation of resources and minimize the KTDC's impact on public finances

Oversight and Accountability Options

Technology parks such as the KTDC are characterized by a need for coordinated interaction among a number of public and private entities that are concerned with technology policy and technological development. For this reason, successful technology parks generally evidence management structure that allows for decisive and responsive strategic decision making while providing sufficient coordination to build a broad consensus about the park's operations and development planning. Most of these structures fall under one of the following three categories:

1. **New public agency**. In many cases, a new public entity is created that assumes responsibilities formerly assigned to different ministries. An example of this is the National Science and Technology Development Agency in Thailand, an executive branch agency that reports directly to the president's office. These kinds of agencies tend to be large and centralized, since they assume responsibilities derogated by many existing public bodies.

2. **Division of an existing ministry**. In some countries, technology park oversight and accountability responsibilities largely fall within the scope of a single existing ministry. In these cases, a ministerial division can be established with jurisdiction over technology development. For example, Japan created the Science and Technology Agency within the Ministry of Trade and Industry to promote science and technology policy. PIEFZA was initially also created as a unit within the Ministry of Industry. This approach works well in situations where individual ministerial strategies are coordinated closely, and identification with a single ministry does not compromise inter-ministerial cooperation.

3. **Public authority with delineated responsibilities**. Under this approach, a new public authority is constituted, with a membership that representing key stakeholders – generally selected from related ministries, educational institutions, and private sector representatives. Such public authorities can have an independent budget and staff (some independent authorities have the power to levy taxes and issue bonds), or act simply as an oversight board for the technology park. Independent public authorities appear on an organization chart much as a new public agency does, reporting directly to the executive or legislative branch. An independent authority, for example, governs Research Triangle Park in North Carolina. Its board constitutionally includes representatives appointed by the three neighboring research universities, the governor of the state, and the speaker of the state legislature. This approach works well for new technology development initiatives, where collaborative support across government entities needs to be mobilized.

An Appropriate KTDC Oversight Model

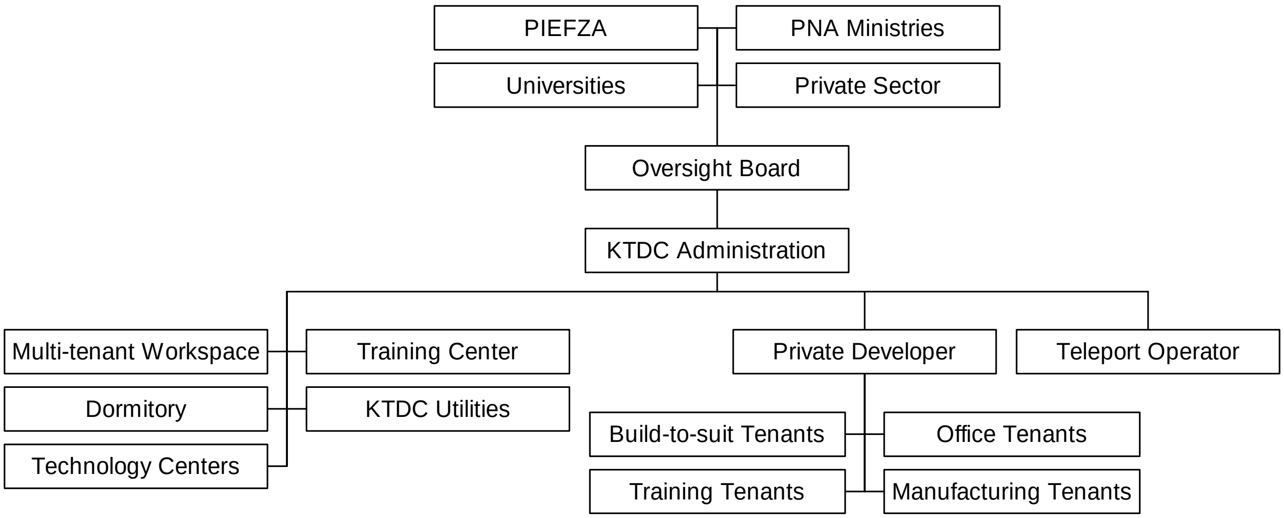
A variation of the third model, the public authority with delineated responsibilities, is most appropriate for the KTDC. Creating a new monolithic public agency that assumes the powers of existing ministries is overly ambitious in the Palestinian context, where relatively new ministries are still growing into their full roles. Likewise, assigning oversight responsibility to a single ministry would be difficult in West Bank/Gaza, where no single ministry has the requisite experience in managing technology development, educational/training reform, and cross-border negotiations. These two approaches are generally more successful in countries that have a demonstrated track record in fostering technological growth, where a single body is then assigned as the steward of an established set of national policies.

New initiatives, on the other hand, require more flexibility and inter-agency coordination than these models afford. As new technology parks are developed, the oversight and accountability function must respond to unforeseen challenges such as unanticipated jurisdictional issues, licensing procedures, and changes in market conditions. Especially in cases where new models for private provision of public infrastructure are developed (i.e. licensing of a teleport operator or BOO/BOT utilities), a broad yet responsive oversight function is critical for success.

Achieving this flexible and responsive structure does not require the creation of a complex new entity. Because the structure draws on the powers and resources of its members, real oversight and accountability authority can simply be vested in an Oversight Board that draws its members from PIEFZA, the university system, private sector representatives, and relevant PA ministries. The ministries represented on the board should be limited to a small core, such as Planning and International Cooperation, Education, and Higher Education (Industry would already be represented through PIEFZA). A representative from the Tulkarem Municipality could also serve on the Oversight Board.

A proposed KTDC institutional framework that incorporates such an Oversight Board is illustrated in figure 9.1:

Figure 9.1: Proposed KTDC Organizational Structure



Administration and Management

While this proposed Oversight Board is endowed with the broad membership and authority to formulate the KTDC's development policies, it has neither the staff nor the resources to deal with the KTDC's operational decisions. Decisions regarding KTDC should be fully derogated to a KTDC Administration that is physically located within the KTDC, and headed by a professional Manager and full-time staff. This KTDC Administration should report to the Oversight Board through an annual reporting and budgeting process, in which the Manager recommends initiatives for the next year and requests a budget. This budget could either be allocated directly through the Oversight Board or as earmarked funds that are approved as part of the individual ministry budgets. The KTDC Administration would then be directly responsible for managing three groups of activities:

1. Public facilities and technology support institutions
2. The private developer and tenants within the KTDC
3. Specialized service providers such as a teleport operator

Public Facilities

The KTDC Administration should be housed in a **Central Administration Building** that includes offices, a small auditorium for presentations to prospective tenants and developers, and a conference room for management meetings. Small offices could also be developed to allow an on-site presence of the key governmental actors that need to work together to make this development successful. In addition, the KTDC Administration would oversee a number of other public facilities.

Central among these is the KTDC **Training Center** that has already been described in section 9.3 above. This includes both the new physical training structure developed under the KTDC, as well as the new institutional links with the established Khadoury Technical College that is to be integrated under the KTDC. In general, the activities occurring within the Training Center are directed to workers and potential workers, not toward research in new product and processes.

The Khadouri Technical Institute traditionally has trained students in degree and certificate courses. Those programs would need to be revised and expanded, and new facilities developed, to be consistent with the needs of the KTDC as a whole. In addition, new facilities and programs need to be developed to accommodate the needs of industry, using what is commonly referred to as “customized job training.”

The Training Center will draw students from both he KTDC’s workforce and from potential workers in the rest of West Bank/Gaza. In order to accommodate students as well as visitors to the KTDC, the KTDC Administration should oversee an on-site **Dormitory** that can house short-term guests for the duration of their training activities. This dormitory will also encourage technicians who travel between KTDC tenant joint venture companies and their parent companies to increase their stays at the KTDC.

The KTDC Administration also manages the **Multi-tenant Workspace**, a facility that offers relatively small office space units at subsidized rental rates to small businesses and individual entrepreneurs. While this Multi-tenant Workspace is intended to foster entrepreneurial development, it is distinct from a traditional business incubator. Strictly speaking, an incubator is developed for scientists – often affiliated with a university or medical or engineering center – to develop a scientific innovation to the commercial stage, obtain a patent, and arrange a license for production of the good or service. This type of research-to-market activity is not anticipated to play a major role in the KTDC’s early years. Rather, demand will likely come from new joint ventures, small groups of software professionals, and returning diaspora Palestinians who want to establish a technology-related business. Over time, new technologies may be developed, and the multi-tenant building could take on attributes of an incubator, with the appropriate services.

Because the Multi-tenant Workspace is subsidized, the KTDC Administration will apply screening criteria to companies, based on their technology utilization, business plan, and over-all compatibility with the KTDC's development mission. These criteria can be changed over time to reflect the changing nature of both potential tenants and the KTDC economy. As demand for space increases, a "graduation period" will be imposed, thus relocating successful businesses into commercial office space. Admission criteria can include:

- An innovative, technology-based product idea or business concept
- The beginnings of a sound management and/or product development team Minimum working capital
- A product that is close to (i.e. less than 2 years from) market
- Realistic financials demonstrating significant revenues within the first five to seven years
- A desire to leverage the services offered by the KTDC

The Multi-tenant Workspace is conceived as a facility with an open floor plan and modularity, to suit businesses with varying space needs. The building would have shared utilities and support services, such as a secretariat, copying, centralized computer support, marketing assistance, regulatory compliance, and human resources.

The Training Center, Multi-tenant Workspace, and all KTDC tenant companies will also be supported by **Technology Centers.** These Centers will provide central facilities and services in specialized disciplines such as software development or hardware/network support. Future Centers could serve new industries, such as biotechnology or agricultural sciences. It is common for technology parks to house technology centers as a way to create locational clusters in particular technology areas. Several parks among those profiled in chapter 4 have such facilities. For example:

- Hsinchu Science Town has six technology centers: the Precision Instruments Development Center, the Synchtronic Radiation Research Center, the National Space Program Office, the Chip Implementation Center, the National Center for High Performance Computing, and the National NANO Device Laboratories.

- The National Science and Technology Development Agency Park in Thailand built three national centers on site, in biotechnology, metals and material technology, and electronics and computer technology.

Other parks take a similar approach. Research Triangle Park in North Carolina, for example, has two technology centers, one in information technology and microelectronics and another in biotechnology. Taaedok Science Town in Korea has more than 40 research institutes nearby. There are many other examples. The content and function of these technology centers differ. In general, they contain specialized equipment and resources in a particular technology area that are appealing to private businesses in that sector. They could contain laboratories for government R&D personnel, or clean rooms, supercomputers, and other costly facilities and equipment for use by industry as well as government scientists and engineers.

Technology centers are financed in different ways: by government via grants and subsidies, by fees for services, by royalty and copyright, by membership dues. It is anticipated that the KTDC's Technology Centers will be sufficiently market-oriented and basic in their initial service and facilities provision that they can be run on a financially sustainable basis. Over time, a subsidized approach may be necessary if more exotic and expensive facilities are required to support new and emerging technologies at the KTDC.

The last public component that is overseen by the KTDC Administration are **KTDC Utilities**. Where appropriate, the KTDC may be equipped with its own utility generation and distribution. However, it is anticipated that private sector participation in public infrastructure will be maximized in the KTDC. In addition, the KTDC will take maximum advantage of opportunities to outsource or privatize functions within the public components, wherever appropriate.

These public facilities not only represent valuable resources for KTDC investors, they also reinforce each other in an integrated fashion. Companies in the Multi-tenant Workspace can benefit from offerings in the Training Center and from specialized services in the Technology Centers. The Dormitory expands the possible base of students who take advantage of the Training Center, which in turn increases the range of training that can be offered on-site.

Private Developer

The KTDC Administration will also oversee the **Private Developer** (or developers) who takes on the responsibility to improve the raw KTDC land through a number of development activities. These include the installation of services, with serviced land parcels then

Box 9.3: Research Triangle Park Technology Center for IT and Microelectronics

Research Triangle Park's technology center in information technology is a separate corporation that offers cost-effective access to advanced electronic and information technologies and services for businesses, for state and federal government agencies and for North Carolina's education communities to provide our clients with a competitive advantage. It:

- Maintains advanced capabilities - staff and facilities - in emerging electronic and information technologies. Partnering with a variety of customers, MCNC uses its resources to develop and apply technologies with commercial value, to help businesses integrate the latest innovations into their products and to help build a competent work force.
- Features two service centers for the state's universities. One runs a statewide network, providing Internet access, data sharing and videoconferencing. The second center features a variety of world-class, advanced supercomputing resources.
- Leverages a history of leading-edge collaboration with research and development communities to work now with industry in many ways - through joint ventures, partnerships, and spin-offs
- Works with clients to develop and apply innovative solutions to micro-fabrication-based problems, working closely with businesses, government agencies and researchers to reduce the time it takes to develop and commercialize new products and to improve our clients' competitive positions in the global marketplace.
- Provides its customers with the networking and computing resources needed to compete internationally -- partnering with a wide range of business, government and academic customers, offering interoperability testing for new products and processes and applying new technologies for rapid product commercialization

being leased to **Built-to-suite Tenants**, who construct their own facilities. The developer will also construct buildings on a speculative basis to attract **Office Tenants** and **Training Tenants** who wish to locate in the KTDC. In addition, a limited portion of the KTDC land may be available for a limited number of technology-intensive **Manufacturing Tenants**.

Because the private developer will conduct the bulk of physical improvements to the KTDC site, close coordination with the KTDC Administration is critical. The developer or other private businesses may provide virtually all of the KTDC's facilities and services, through a variety of contractual arrangements.

Specialized Services

In addition to any KTDC Utilities, the KTDC Administration will also oversee specialized service providers such as a private **Teleport Operator**. Such a provider is unique in that the operator will likely be the sole provider of telecommunications services in the KTDC, and thus fall under a unique regulatory regime. This will require both specialized regulation/supervision and, potentially, unique service provision arrangements (perhaps with public partners) that must be coordinated closely with the KTDC Administration.

A sizable section of the site should be reserved for custom-built facilities, developed by real estate brokers for rent or by companies themselves. Palestinian law will determine whether the facilities could be owned fee-simple, or could be leased long-term, reverting back to the government after no less than 40 years. The TTC management would have to establish criteria for these building, in terms of allowable uses and design.

10. KTDC Product Definition: Physical Facilities

10.1 Introduction

This Chapter examines the physical planning required to achieve the KTDC product as defined in Chapter 9, and developing at the rate projected in Chapter 8.

In addition to planning the physical layout of the site, other considerations need to be taken into account during the planning process. The Environmental Impact of the project needs to be assessed, and any potential damage to the environment mitigated in some fashion. This aspect is summarized here, and the full environmental assessment is contained in the annex volume.

The final output of this physical planning analysis is an indicative plan of the layout of the proposed project and its services, and a capital budget estimate for the plan. These may be found in Annexes A and C respectively.

It should be noted that while the KTDC masterplan makes every effort to accommodate the desires and wishes of all of the stakeholders in the project, the result is a framework that can be used as a basis for making a decision on how to proceed. The plan is not fixed, and should respond to market and other needs as the project develops. For this reason the plan is phased in such a way to allow maximum flexibility in the future.

The KTDC as conceived here is a unique development in West Bank/Gaza. While the physical planning aspects are important, they are directly related to the institutional, legal and regulatory aspects as discussed in Chapter 9. The physical planning aspects should and do reflect this.

10.2 Planning Issues

The main planning issues that need to be addressed in the masterplan of the KTDC are listed below. These were already mentioned in Chapter 6.

1. The uses proposed for the Khadoury Technology Development Center are very varied. The accommodation of

such diverse uses within a relatively confined site will require careful planning.

2. The preservation of the campus atmosphere at the site will be a contributory factor to its success. This will present some challenges especially in a landscape where water is relatively scarce and precious, and where development pressure can be high.

3. The phasing of development will have to accommodate the probable continuation of existing uses of the land, and the preservation of antiquities where appropriate.

4. Access to the site (ingress and egress) will be complicated by its proximity to the green line. This is also a positive characteristic of the site that should be fully exploited. The concept of easy public access to the site is also attractive from the perspective of community development and public relations.

5. Infrastructure design will be carried out in difficult circumstances where the status of planned infrastructure projects such as the proposed municipal sewage treatment system is still not clear.

6. Finally, the project should balance the industrial development needs of the community with their educational development needs. The physical design should manifest this partnership between education and industrial development.

10.3 Demand

The demand being serviced by the masterplan is the demand projected in Chapter 8. This is repeated in Table 10.1 below for information. Development costs are projected on a per m^2 basis, so that any sensitivity analyses on demand are contained in the financial analysis. The phased nature of the planning ensures that whatever the projections, actual demand dictates the real pace of development.

Table 10.1: Projected Floor-space demand for the KTDC

Tulkarem TDC Floorspace Uptake

	Phase I					Phase II					Phase III	
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 15	Year 20
Training Facilities												
Actual m2	2,500	3,500	4,150	5,450	5,450	8,100	8,100	8,750	8,750	8,750	8,750	8,750
Uptake	6%	9%	10%	14%	14%	10%	10%	11%	11%	11%	11%	11%
Office Space												
Actual m2	2,930	7,110	11,080	15,680	19,780	23,440	30,370	33,530	37,810	43,210	56,010	58,010
Uptake	7%	18%	28%	39%	49%	29%	38%	42%	47%	54%	70%	73%
Manufacturing												
Actual m2	0	0	0	1,200	3,600	4,800	6,000	9,200	9,200	11,200	13,200	13,200
Uptake	0%	0%	0%	3%	9%	6%	8%	12%	12%	14%	17%	17%
Total Floorspace												
Maximum allowed m2	40,000	40,000	40,000	40,000	40,000	80,000	80,000	80,000	80,000	80,000	80,000	80,000
Actual m2	5,430	10,610	15,230	22,330	28,830	36,340	44,470	51,480	55,760	63,160	77,960	79,960
Uptake	14%	27%	38%	56%	72%	45%	56%	64%	70%	79%	97%	100%

10.4 Planning Proposal

During the course of the feasibility study, alternative planning proposals were developed and costed in order to assess the impacts of different proposals in the amount of space allocated to different uses, the configuration of the site for different phases, and the basic assumptions about service provision. These alternatives were discussed in detail with USAID, PIEFZA, PA ministries and agencies, and other stakeholders.

Based on these discussions, a final planning design was developed. This design is illustrated in Figure 10.1 below. Section 10.5 then describes the design's individual elements.

Figure 10.1: Proposed KTDC Development and Phasing Plan

10.5 Functional Elements

Each of the elements represented in the Proposals are discussed briefly in this section.

Phases

It is envisaged that the site will be developed in 3 main Phases, each of which is divided into two stages. Phase 1 will begin development near the existing Technical College, and establish the main east-west road connection between Tulkarem and the Green Line. Phase 2 then builds out the site's northern and southern perimeter, while Phase 3 develops the remainder of the available land along the western edge of the site.

This phasing has two main objectives – to allow inaccessible land to be packaged for later use when current restrictions on use are lifted (e.g. the DCO site); and to segment the project so that changes in development strategy during the life of the project can be more easily accommodated.

Entrances

Two main entrances are envisaged – one opposite the existing Israeli border post and one alongside (and shared with) the existing Tulkarem Technical College. The site as currently designed is fenced with a security check-point at each entrance, but it is envisaged that access to the site, although regulated, will be freely available to all. The KTDC will house many offices of interest to the general public. The boundary of the site will have a 10 meter green belt, planted and irrigated.

Immediately usable sites

As mentioned in Chapter 6, part of the attraction of the KTDC site is the availability of immediately developable space. Given that the total area contained within the proposed boundaries is 20 ha, of this 12 ha is immediately usable without interfering with any existing use. Most of the initial development is contained within this space. Areas excluded are the DCO, the existing old buildings to the south west of the existing Technical College, and the War Memorial.

Central Services

The Khadoury Technology Development Center will offer a wide range of services to its clients. The Central Services Area will accommodate the staff of the KTDC Administration, offices for branches of national institutions that wish to have a presence on the site, banking services, telecom services, some exhibition and conference space, medical services, a restaurant and some areas for commercially traded services such as cleaning and building maintenance.

Training Spaces

Training spaces are provided for two types of training – office type facilities and workshop type facilities. These will be provided in response to demand and will include classrooms/conference halls, computer laboratories, and production training workspaces.

Multi-tenant Buildings

This is the majority of space that will be provided by the private sector. It is essentially office space, and will include incubator-style "multi-tenant workspace" as well as space for established firms to lease for the activities envisaged such as software development, internationally traded services, and so on.

Special Production Areas

This space will accommodate activities that require open areas, have some production or workshop suited element, and who have qualified through the KTDCA to occupy this type of space. In many cases this space will accommodate start-up firms who have graduated from the multi-tenant workspace program, or who are undertaking pilot manufacturing prior to starting up in a larger facility outside of the KTDC.

Water System

It is envisaged that the KTDC will obtain its water supply from the municipal system in Tulkarem. The existing well on site does not have water of potable quality, so this will be used to supply the fire-fighting needs of the site and some irrigation.

The overall water needs of the site at full occupation are estimated at about 400 m^3 per day, and an elevated tank of this capacity is provided in the masterplan.

Electrical Supply

It is clear that the existing electricity supply system in Tulkarem in general is inadequate, and needs to be upgraded. At full demand, the KTDC will need a 6MW power supply – approximately 2MW per phase. The most effective approach is to connect directly into the Israeli grid, and to supplement this connection with an on-ste standby generator to ensure continuity of supply under all circumstances.

Storm Water collection

This will be collected trough the storm drainage system, and discharged off-site and/or reused for irrigation. Costs budgeted for include a filtration system prior to discharge to infiltration basins.

Sewage Treatment

The KTDC design, as proposed here, will provide its own sewage treatment plant, located in the northern corner of the site. This modular treatment plant will initially have a capacity of 150 m3/day, which will be expanded to 300 m3/day in Phase 2. This approach is based on the uncertainty regarding the timing and funding of an upgraded municipal treatment plant for the Tulkarem municipality.

However, while treatment on site will manage the KTDC's own effluent and subsequent environmental impacts, it will not eliminate the existing sewage ponds across the road from the KTDC site. Existing problems associated with untreated sewage will remain, even through proper measures are taken on site. If the problems across the road are remedied, and the treated effluent made available for local use, then the KTDC can discharge to this system.

Based on these points, a site has been made available for a sewage treatment plant on site, and the plant has been included in the capital budget. However, it is recognized that this cost item may instead be spent in helping to upgrade the existing municipal system, if that is deemed more appropriate when the project commences.

Fire Mains

The fire hydrant system uses water from the well on-site. Booster pumps provide the necessary head for fire-fighting purposes.

Irrigation System

The irrigation system is supplied from the same source as the fire system.

10.6 Telecommunications

As noted in the demand forecast (Chapter 8) the existence of good telecommunications facilities is essential to the development of the KTDC.

Telecoms Needs

The needs of the industries being targeted for the KTDC can be summed up in one word – bandwidth. If the most optimistic demand projections for the KTDC in terms of technology workers employed are to be realized, then on a simple basis of a capacity requirement equivalent to Basic Rate ISDN per worker (i.e.

144bps duplex, per worker)[1] and a technology workforce rising to 3,000 in year 20, the capacity required would be 144Mbps, duplex, in year 5 rising to 288Mbps by the end of 10 years.

This bandwidth would need to be provided at a reasonable cost to the end user, at rates lower than Paltel's current rates for leased lines – for example in Israel a 64kbps line to the US is a mere US$200 per month, compared to a likely charge of US$4,000 per month for a KTDC enterprise.

Bandwidth Supply

The required bandwidth can be provided in two ways – through the PALTEL network at concessionary rates once their own international gateways are established, or through a separate on-site Teleport with direct access to satellite communications.

The on-site Teleport option of the scale mentioned above is estimated to cost between US$600,000 and US$1,000,000 in initial on-site capital costs, and an annual operational cost of about US$5 million rising to US$20 million by the time the KTDC is full. This gives an indication of the size of the business in a fully deregulated environment where the services are sold within the KTDC and there would be no connection to the rest of West Bank/Gaza. Operating this type of facility will, of course, require both a special concession arrangement with the PA as well as agreement on regulatory issues with Israeli authorities.

Given that PALTEL is in the process of upgrading the entire telecommunications infrastructure in the West Bank, and that the Palestinian Authority has the power to rule on tariffs in education-related instances, the provision of a Teleport at the KTDC by Paltel within their new infrastructure would seem to be the logical means to ensure the growth of the KTDC. The alternative would be to deregulate telecommunications services within the KTDC, allowing an operator to set up his own gateway.

Site Distribution

The cost estimates for telecommunications distribution throughout the KTDC – central switch and fiber optic cabling has been included in the cost estimates in Tables 10.3 and 10.4, but External Teleport costs are thus excluded. It is assumed that any

[1] Bandwidth estimates and costs were estimated with the assistance of Peter MILNE, Principal Consultant, Aetheric Engineering Ltd., UK

additional telecommunications infrastructure will be built on a private sector concession basis, and function essentially as a special tenant of the KTDC.

10.7 Capital Costs

The capital cost estimates associated with the proposals in the masterplan are outlined below in Tables 10.3 to 10.6.

These costs are net of professional fees which will be levied at approximately 10%. The detailed breakdown of these costs may be found in Annex C.

The figures used in the financial analysis are based on these costs, but are applied on a per hectare or per m^2 basis (as appropriate). Also, recurrent costs used in the financial model are based either on zero-based budgeting or on other assumptions that are clearly stated in the Financial and Economic Analyses – Chapters 11 and 12. Therefore, the recurrent cost detailed in the table below are included as a guideline only.

Table 10.3: Overall KTDC Capital Budget over 3 Phases

		Phase 1		Phase 2		Phase 3		Total	
No.	***Item***	***Capital***	***Recurring***	***Capital***	***Recurring***	***Capital***	***Recurring***	***Capital***	***Recurring***
1	Buildings	15,620,777	390,519	14,774,952	369,374	11,611,416	290,285	**42,007,145**	**1,050,179**
2	Fire Water System	232,500	23,250	32,000	3,080	32,000	3,080	**296,500**	**29,410**
3	Landscaping	1,627,910	84,022	1,025,610	35,957	714,460	48,811	**3,367,980**	**168,790**
4	Sewage Treatment	720,100	17,858	532,800	13,320	16,200	348	**1,269,100**	**31,525**
5	Stormwater Drainage	235,500	5,888	49,500	1,238	23,200	2,320	**308,200**	**9,445**
6	Water Supply	411,360	18,636	7,700	770	17,860	1,786	**436,920**	**21,192**
7	High Voltage Supply	876,301	61,418	436,700	23,233	344,340	22,209	**1,657,341**	**106,859**
8	Irrigation	123,800	14,880	860	136	32,820	3,282	**157,480**	**18,298**
9	Telecommunications	340,000	34,000	57,250	5,725	31,750	3,175	**429,000**	**42,900**
TOTAL		**20,188,248**	**650,470**	**16,917,372**	**452,832**	**12,824,046**	**375,296**	**49,929,666**	**1,478,598**

11. Financial Analysis

11.1 Financial Overview

The Khadoury Technology Development Center pro-forma financial model is contained in Annex C of this report. It seeks to gauge levels of investment and returns for prospective public and private-sector investors and operators over an initial twenty-year development period. The analysis segments the investors/ operators into eight cost centers—four public and four private. These are listed in Table 11.1 below.

Table 11.1: Cost Centers for the Financial Model

Public-Sector Cost Centers	Private-Sector Cost Centers
Admin & Overhead (incl. 20 ha parcel)	Serviced Land
Technology Center	Office Space
Training and Dormitory	Manufacturing Space
Multi-Tenant Workspace	Training Space

The model then combines the public-sector cost centers into one view and the private-sector cost centers into a separate view. Outputs delivered by the model for each cost center and for the combined public and private views include:

- Phased cost development schedules
- Income, operating costs, and cash flow projections
- Balance sheets over the twenty year timeframe
- Rates of return (NPV and IRR)

11.2 Financial Assumptions

A number of assumptions were applied to the Base Case Scenario. These are listed below:

1. Land is to be transferred via long-term capital leases, requiring 20% payment up front. The assumed lease term is 50 years and the assumed interest rate is 8%. These terms are applicable for both transfers of raw land and serviced land (land with onsite infrastructure added for subsequent development).

2. The initial value of the raw land is assumed to be $100,000 per ha.

3. Raw land is to be transferred to private and other public investors at an imputed price of $120,000 per ha.

4. It is assumed that 50% of the raw land transferred to the private sector will be built on to fill the demand for commercial office, manufacturing and training space. The rest of the raw land will be developed into serviced land—land with onsite infrastructure added—and subsequently transferred to other developers. (See private-sector cost centers in the Table 11.1 above.)

5. It is assumed that the serviced land will be transferred at cost (including costs for adding services) plus a 25% markup.

6. Offsite infrastructure represents major capital expenditures required of the principal land-owning entity in order to effectively market the KTDC. These include electric utility upgrades, building a fire water supply network, building a waste water treatment plant, and adding telecommunications improvements.

7. Onsite infrastructure represents those expenditures made by developers in order to add services to the raw land. Examples of these services include utilities upgrades, roads and parking lots, a storm water network, a water supply network, and an irrigation network. Onsite infrastructure expenditures are estimated at about $222,000 per ha.

8. An 8% interest rate has been applied to all financing activities. Repayment terms are assumed to coincide with depreciation schedules. Table 11.2 below summarizes the capital financing assumptions

Table 11.2: Capital Financing Assumptions

Asset	% Financed	Repayment
Land (per cap lease assumptions)	80%	50 years
Offsite Infrastructure	70%	30 years
Onsite Infrastructure	80%	30 years
Buildings	80%	25 years
Computer Equipment and Systems	80%	3 years
Office Equipment	80%	5 years
Other Equipment	80%	5 years

9. Initial annual lease rates for the three commercial products are as outlined in Table 11.3:

Table 11.3: Annual lease rates

Product	Annual Rent
Office	$59/m^2$
Manufacturing	$42/m^2$
Training	$59/m^2$
MTWS (qualifying tenants)	$44/m^2$

These lease rates represent average market rates for the Tulkarem area. MTWS rents are subsidized for qualifying tenants and charged at 75% of market rates.

10. Real escalation of 3% annually for land and lease prices has been built into the model.

11. The income tax rate is 20%. A 100% tax holiday will apply during the first 5 years, while a 50% holiday (10% tax rate) will apply over the next 16 years.

11.3 Financial Outcomes

The base case yielded negative cash flow and returns for both Public and Private cost centers. In order to gauge the materiality of the negative cash flow on Private cost centers, a subsidy was added to the model. The level of the subsidy is designed to improve the IRR of Private cost centers to 20%. The design of the subsidy mechanism is beyond the scope of this analysis. For purposes of this study, the model treats the subsidy as a cash injection in Year 3. If, in actuality, the subsidy were spread over a period of five years, it would have little material impact on the levels recorded below. Table 11.4 below provides returns by cost center for the base case:

Table 11.4 : Base Case returns by cost center ($000)

Cost Center	NPV@ 5%	NPV@ 15%	IRR w/o Subsidy[1]	IRR w/ Subsidy[2]	Subsidy[2]
PUBLIC SECTOR:					
Administrative	(16,223)	(8,244)	N/A	N/A	N/A
Technology Center	(9)	(60)	4.19%	N/A	N/A
Training & Dormitory	(2,846)	(2,010)	N/A	N/A	N/A
Multi-Tenant Workspace	(449)	(276)	N/A	N/A	N/A
Combined Public	(19,527)	(10,278)	N/A	N/A	N/A
PRIVATE SECTOR:					
Serviced Land	(224)	(68)	49,71%	49.07%	49
Office	(1,258)	(1,504)	(0.61%)	22.62%	1,751
Manufacturing	(381)	(413)	(4.07%)	19.60%	502
Private Training	(188)	(162)	(13.99)	20.09	184
Combined Private	(1,965)	(1,965)	(2.55%)	19.98%	2,487

1 If negative cash flows are too great or never become positive, the IRR calculation is meaningless.
2 Subsidies are only applicable to private-sector cost centers.

The net present value of the combined subsidy at 5% and 15% is $2.0 million and $1.5 million, respectively.

Sensitivity analyses off the base case were run in order to test the effect of changes in demand and capital costs on returns.

<u>Demand Sensitivity—Plus or Minus 20%</u>

When demand was increased by 20%, it slightly improved the cash flow of the Administrative and Serviced Land cost centers. However, all other cost centers were hurt by increased demand. Conversely, when demand was decreased, the Administrative and Serviced Land cost centers experienced slightly worse cash flow, while the cash flow of the other cost centers improved.

The model assumes that land is developed efficiently, in time with demand, regardless of an acceleration or deceleration in demand. In other words, decreased demand does not indicate, from the model's standpoint, that there is significant built space that sits empty. It only indicates that the development is progressing more slowly than it otherwise could. The conclusion drawn from this sensitivity analysis is that development of the KTDC does not make financial sense for private sector developers, given the assumed revenue streams and costs. When the demand is greater than the base case, increased subsidies are required. When demand is less than the base case, the amount of subsidies required decreases.

Capital Cost Sensitivity—Plus or Minus 20%

When capital costs were increased by 20%, the cash flows were greatly impaired. The IRR calculation was in most cases meaningless, even with subsidies set to bring NPV to $0 using a 15% discount rate. Table 11.5 summarizes the cash flows for the private cost centers with subsidies (in US Dollars):

Table 11.5: Cash Flows for Private Cost Centers with subsidy, capital costs plus 20%

Cost Center	IRR w/ Subsidy	Subsidy	Year Cash Flow Turns Positive
Serviced Land	34.85%	$44,221	1
Office	N/A	$1,734,869	15
Manufacturing	N/A	$563,175	17
Private Training	N/A	$202,255	20
Combined IRR/Subsidy	(9.76%)	$2,544,520	

When capital costs are decreased by 20% from the base case, cash flow is significantly improved, even for the Public cost centers. Table 11.6 below summarizes the four private sector cash flows and the subsidies required to achieve a 20% IRR.

Table 11.6: Cash Flows for Private Cost Centers with subsidy, capital costs minus 20%

Cost Center	IRR w/ Subsidy	Subsidy	Year Cash Flow Turns Positive
Serviced Land	64.69%	$0	1
Office	19.97%	$938,974	11
Manufacturing	20.01%	$256,341	11
Private Training	6.87%	$152,001	9
Combined IRR/Subsidy	19.75%	$1,347,316	

Table 11.7 recaps the NPV levels (at 15% discount rate) for the Public cost centers from the various scenarios run. Table 11.8 recaps the subsidy levels required to get the Private cost centers to a 20% IRR, keeping in mind that for Scenario 4, cash flow was so impaired that combined IRR could never get to 20% - the numbers indicated in this case are subsidies required to attain an IRR of 0%

Table 11.7: Public Cost Center Recap—NPV (US Dollars)

Scenario	Admin	Tech Center	Public Training	MTWS	Combined
#1—Base	(8,244,427)	(59,791)	(2,010,454)	(276,155)	(10,277,993)
#2—Demand + 20%	(7,903,562)	(71,749)	(2,802,248)	(331,386)	(10,682,713)
#3—Demand - 20%	(8,687,698)	(47,833)	(1,218,758)	(220,924)	(9,975,764)
#4—Capital Costs + 20%	(11,306,842)	(121,479)	(2,738,676)	(392,747)	(14,121,673)
#5—Capital Costs – 20%	(7,756,664)	(751)	(1,335,265)	(150,204)	(9,048,944)

Table 11.8: Private Cost Center Recap—Subsidy Required to Achieve 20% IRR (except for case 4, where IRR=0%) (US Dollars)

Scenario	Serviced Land	Office	MFG	Private Training	Combined	NPV@15% of Subsidies
#1—Base	48,904	1,750,980	502,292	184,393	2,486,569	1,484,442
#2—Demand + 20%	79,039	1,890,194	584,959	221,036	2,775,228	1,644,917
#3—Demand - 20%	78,770	1,384,471	403,708	147,513	2,014,462	1,197,349
#4—Capital Costs + 20%	*167,586*	*2,462,210*	*907,185*	*416,735*	*3,953,717*	*2,301,655*
#5—Capital Costs – 20%	0	938,974	256,341	152,001	1,347,316	803,785

Table 11.9 – Public Sector Capital Expenditure Years 1- 20

Financial Analysis

Combined Public
Combined output for the public sector

Year	0	1	2	3	4	5	6	7	8	9	10
m2 Developed (per Demand Schedule)		3,120	1,600	660	420	-	2,000	300	-	-	-
Cumulative m2 Developed (Demand)		3,120	4,720	5,380	5,800	5,800	7,800	8,100	8,100	8,100	8,100
m2 Developed (input)		3,120	1,600	660	420	-	2,000	300	-	-	-
Cumulative m2 Developed (input)		3,120	4,720	5,380	5,800	5,800	7,800	8,100	8,100	8,100	8,100
Capital Budget											
Land	1,000,000	87,600	49,440	21,006	13,768	1,125,509	69,556	10,746	-	-	-
Offsite Infrastructure	2,161,610	-	-	-	-	1,050,005	-	-	-	-	364,595
Onsite Infrastructure	-	173,340	88,893	36,668	23,334	-	111,116	16,667	-	-	-
Building Construction Costs	-	1,263,776	668,666	305,917	194,674	-	781,120	139,053	-	-	-
Computer Equipment & Systems	-	188,000	110,000	-	23,000	275,000	110,000	23,000	-	385,000	23,000
Office Equipment	-	34,000	20,000	-	-	-	24,000	-	-	-	-
Other Equipment	-	129,112	30,000	-	-	-	114,112	-	-	-	-
Total Capital Budget	3,161,610	1,875,829	966,999	363,591	254,777	2,450,514	1,209,904	189,467	-	385,000	387,595

Year	11	12	13	14	15	16	17	18	19	20
m2 Developed (per Demand Sche	-	-	-	-	-	-	-	-	-	-
Cumulative m2 Developed (Demaı	8,100	8,100	8,100	8,100	8,100	8,100	8,100	8,100	8,100	8,100
m2 Developed (input)	-	-	-	-	-	-	-	-	-	-
Cumulative m2 Developed (input)	8,100	8,100	8,100	8,100	8,100	8,100	8,100	8,100	8,100	8,100
Capital Budget										
Land	-	-	-	-	-	-	-	-	-	-
Offsite Infrastructure	-	-	-	-	-	-	-	-	-	-
Onsite Infrastructure	-	-	-	-	-	-	-	-	-	-
Building Construction Costs	-	-	-	-	-	-	-	-	-	-
Computer Equipment & Systems	-	385,000	23,000	-	385,000	23,000	-	385,000	23,000	-
Office Equipment	24,000	-	-	-	-	24,000	-	-	-	-
Other Equipment	114,112	-	-	-	-	114,112	-	-	-	-
Total Capital Budget	138,112	385,000	23,000	-	385,000	161,112	-	385,000	23,000	-

11. 4 Financial Conclusions

The conclusions are clear from the financial analysis – there are three major requirements for the private sector to invest in this project to the degree modeled. These are:

1. All off-site infrastructure must be provided by the public sector in advance of development, and the administration and promotion of the project must be fully supported by the public sector,

2. Development of the KTDC's private cost centers will require some form of subsidy program. The NPV of this subsidy package should be about $1.5 million.

3. While releasing publicly owned land to private developers at below-market rates is a common subsidy approach for technology parks, this approach is insufficient in the case of the KTDC. Releasing public land to the private developer at zero cost lowers the NPV of the required subsidy to $1.1 million, but does not eliminate the need for other subsidies. Of course, this approach also represents an additional cost to the KTDC's public cost centers.

4. Some form of access to soft loans will need to be made available to keep loan interest rates under 10% for the developer.

Under these circumstances it will be possible to interest a private developer in the project. However, there is a high public sector cost attached to this approach – the cost of the infrastructure and land, the cost of running the KTDC, etc. The only way that the Palestinian Authority can make a decision regarding this cost is to weigh it against the economic benefits of the project. This aspect is considered in the next chapter.

12. Economic Analysis of the KTDC

12.1 Introduction

This chapter summarizes the results of the analysis of the economic costs and benefits brought to the West Bank and Gaza (WBG hereafter) by the Khadoury Technology Development Center.

Preceding the summary of results, the chapter reviews the economic model used and states the assumptions utilized in the model.

The economic analysis complements the financial and the fiscal analyses. The analysis is structured as a cost-benefit analysis, reviewing the economic contribution of the Khadoury Technology Development Center to the welfare of Palestinian stakeholder groups assumed to represent the entirety of Palestinian economic interest. The purpose of the economic analysis is to estimate the net incremental economic benefits that the Palestinian economy will derive from the KTDC. Economic benefits and costs accruing to non-Palestinians are therefore not included in the present analysis. It is assumed that the Palestinian stakeholder groups will account for the economic contribution of foreign investors and users of the Center through wages, training provided, technology transfers, and taxes paid to the Palestinian Authority.

The economic analysis measures net economic benefits and costs of the Khadoury Technology Development Center. These benefits and costs would not occur should the KTDC, as proposed in this feasibility study, not be developed. Each of the stakeholder groups identified below will derive both economic benefits and economic cost.

The economic analysis will account for these benefits and costs by estimating aggregated new revenues and expenditures for each of the stakeholder groups. For most of the stakeholders identified in the study, the KTDC will bring economic benefits that must be subtracted from economic benefits they would accrue from alternative opportunities. The accounting of net economic benefits and costs is done through the estimation of opportunity cost. The opportunity cost of a given policy – in the present case the development of the Khadoury Technology Development

Center – for a given stakeholder group is the cost of the next best alternative available. The opportunity cost is calculated on the basis of a shadow price factor attributed to the gross economic benefit estimated. The opportunity cost consequently represents, for a given group of stakeholder, a share of the gross economic benefits they derive from the KTDC. In the absence of available shadow price factors for West Bank/Gaza, shadow prices used in the analysis have been derived from other studies.

The Palestinian stakeholder groups identified are:

1. Palestinian Workers;
2. Palestinian Private Sector; and,
3. Palestinian Authority;

Palestinian Workers

The KTDC will bring significant economic benefits to the Palestinian economy through its labor force. Traditional industrial parks in developing countries usually provide two kinds of economic benefits to the workers: direct employment and indirect employment. Generally, this is the primary direct contribution to the host economy. In the case of the Khadoury Technology Development Center, direct and indirect employment are only one of the economic benefits to workers that are to materialize. The training provided by the KTDC to Palestinian workers through its different components will result in the diffusion throughout the Palestinian economy of a more productive workforce.

A central contribution of the Khadoury Technology Development Center will be the employment of a share of the labor force that has been dependent on Israel for its livelihood. Through the different employment effects, listed below, the KTDC will result in the diminution of this dependency.

Four types of economic benefits to Palestinian workers are accounted in the economic analysis:

1. Wages resulting for direct employment in the Khadoury Technology Development Center;
2. Wages resulting for indirect employment resulting from the increase in spending power generated by direct employment, by the servicing of the KDTC by Palestinian concerns, and the spending of workers trained in the Center; and,

3. Wage increases brought to Palestinian workers trained in the KTDC facilities and captured by these workers in the form of increased wages.
4. Wages resulting from net new employment generated by new enterprises stemming from the Khadoury Technology Development Center.

In addition to the economic benefits brought to a number of Palestinian workers, the Khadoury Technology Development Center will produce a number of effects that will negatively affect Palestinian workers. Firstly, the new employment created in the Center will be affected by varying opportunity costs resulting from the displacement of workers from other parts of the economy to the KTDC. Secondly, the KTDC will likely result in the displacement of a number of Palestinian workers in and out of Tulkarem as a consequence of the relocation of a number of firms to the Center. Thirdly, a number of directly and indirectly employed workers will face commuting expenses brought by their new employment.

Adding to these costs, Palestinian workers will face income and other taxes retrenched from their salary earnings.

Palestinian Private Sector

As in the case of the Palestinian labor force, the Khadoury Technology Development Center will positively affect the Palestinian private sector in a number of ways. In contrast to traditional industrial parks, which benefit primarily to investors inside the park, the KTDC will bring its most significant benefits to firms outside the park. First, Palestinian firms in the information technology sector and firms using information technologies will benefit from increased profits emanating from the more productive workers employed. Second, through the provision of management training and through the assistance of the incubator, the KTDC will play a demonstration and catalytic role in the Palestinian economy.

Economic benefits will come from profits made by Palestinian firms:

1. The Center will generate incremental net increases in profit for Palestinian firms investing in the Center;

2. The Center will lead to incremental net increases in the profit of Palestinian firms employing workers having undergone training in the Training Center.
3. The Center will foster the net creation of new enterprises, as managers employed and/or trained in the center will develop their own businesses. These firms' profit will directly outflow from the existence of the KTDC.

The vast majority of these profits will remain in the Palestinian economy.

As with Palestinian workers, the KTDC will result in economic costs to the Palestinian private sector. These costs will primarily be as direct taxation of corporate profits and other taxes paid by firms outside of the Khadoury Technology Development Center. Additional cost will result from the limited closures that will take place outside of the Center, expressed by a loss of profits in the short term, compensated in the long term by the increased productivity of the investment in the KTDC compared with the previous investment in RWBG.

Palestinian Authority

The Palestinian Authority stands to derive significant benefits from the Khadoury Technology Development Center. Most of these benefits, however, are fiscal in nature and are captured in the fiscal analysis that follows this chapter. Economic benefits will therefore be limited to the residual value of the Khadoury Technology Development Center at the end of the 20-year period. The PA will not benefit from foreign exchange earnings associated with the Center as there is no Palestinian Central Bank. Finally, on the negative side of the economic contribution to the Palestinian Authority, a significant cost will be associated the opportunity cost of land sold. Environmental degradation will also represent an important cost to the PA.

12.2 The Model

In complement with the financial and fiscal analyses, the economic analysis estimates the economic impact of the Khadoury Technology Development Center over the next twenty years.

The economic analysis is organized along three spreadsheets:

1. **Net Incremental Economic Benefits:**

   For each of the three stakeholder groups identified above, economic benefits that occur over the 20-year period beginning subsequent to KTDC start-up are projected, net of the no-KTDC counterfactual case.

2. **Net Incremental Economic Costs:**

   For each of the stakeholder groups, economic costs for the same period are estimated, net of the no-KTDC counterfactual case.

3. **Balance of Incremental Economic Benefits and Costs:**

   The balance of incremental economic benefits and costs is estimated for each stakeholder groups. Following this, a summed balance, representing the economic benefits and costs to the entire Palestinian economy is calculated, net of the no-KTDC case

4. **Net Present Value:**

   The final spreadsheet represents a calculation of the net present value (NPV) using indicative discount rates (five percent, ten percent, and fifteen percent) for each stakeholder groups and for the entire Palestinian economy. Calculation of the NPV allows an estimation of the projected value of the Khadoury Technology Development Center over the 20-year period at today's value. In addition, calculation of the NPV makes possible the calculation of the economic rate of return (IERR) of the project. The IERR constitutes a concise indication of the economic performance of the KTDC over time, offering an appreciation of the economic benefit of implementing the project compared to the option of not implementing it.

12.3 Parameters and Assumptions

The economic benefit-cost analysis is founded on a number of parameters and assumptions that are listed below:

- **Foreign Borrowing.**

  Foreign and local KTDC firms are assumed to be completely self-financing in hard currency terms. No local borrowing of hard currency by KTDC firms is assumed for both infrastructure development or working capital.

- **Foreign Ownership.**

  It is assumed that foreign firms will constitute 60 percent of ownership of Khadoury Technology Development Center. The absence of a Palestinian Central Bank, however, signifies that foreign exchange benefits will not accrue to the Palestinian economy.

- **Gross Output.**

  Gross output per worker within the KTDC is calculated on the basis of employment projections for the center multiplied by the average gross output per knowledge worker in WBG.

Workers' Cost and Benefits

The analysis of economic benefits and costs to the Palestinian workers assumes the following:

- **National wage and Wage Increases:**

The Palestinian labor force is divided into three skill sub-groups:

a. Unskilled workers;
b. Semi-skilled workers; and,
c. High-skilled workers.

The national wage used in the economic analysis is calculated as the average wage per skill category factored by the total Palestinian labor force.

It is furthermore assumed that wage levels reflect the real productivity of labor.

1. Direct Employment

The analysis assumes that the labor force directly employed in the Khadoury Technology Development Center will represent the following skills mix:

a. Unskilled workers: 10 percent;
b. Semi-skilled workers: 35 percent;
c. High-skilled workers: 45 percent; and,
d. Managers: 10 percent.

Calculation of the opportunity cost of labor provides an accurate estimation of the real benefit for the Palestinian economy of the use of a share of its labor force in the Khadoury Technology Development Center. In effect, Palestinian workers taking employment in the KTDC potential forego alternative opportunities. The opportunity cost calculation provides a measure of the cost of working for the Center.

- **Disaggregated Benefits and Costs to Wage Income:**

The total labor force employed by the Khadoury Technology Development Center is disaggregated into eight sub-groups, assumed to represent a given proportion of the total employed labor force and assumed to have opportunity costs listed below:

1. Immigrant workers from Outside WBG (OWBG):
   - This sub-group is assumed to represent 10 percent of the total KTDC workforce;
   - Opportunity cost is eighty percent.

2. Immigrant workers from the Rest of WBG (RWBG) who were formerly unemployed:
   - This sub-group is assumed to represent 4 percent of the total KTDC workforce;
   - Opportunity cost is zero.
3. Immigrant workers from the RWBG who are underemployed:
   - This sub-group is assumed to represent 2 percent of total;
   - Opportunity cost equals total wage earned by the group multiplied by a shadow price factor (assumed to be 40 percent).

4. Immigrant workers from the RWBG who have alternative employment opportunities:
   - This sub-group is assumed to represent 7 percent of total;

- Opportunity cost equals total wage earned by the group multiplied by a shadow price factor (assumed to be 80 percent).

5. Immigrant workers from the RWBG who had employment in Israel:
   - This sub-group is assumed to represent 8 percent of total;
   - Opportunity cost equals total wage earned by the group multiplied by a shadow price factor (assumed to be 80 percent).

6. Formerly unemployed residents of Tulkarem.
   - This sub-group is assumed to represent 7 percent of total;
   - Opportunity cost is zero.

7. Underemployed Residents of Tulkarem.
   - This sub-group is assumed to represent 14 percent of total;
   - Opportunity cost equals total wage earned by the group multiplied by a shadow price factor (assumed to be 40 percent).

8. Residents from Tulkarem who have alternative employment opportunities:
   - This sub-group is assumed to represent 24 percent of total;
   - Opportunity cost equals total wage earned by the group multiplied by a shadow price factor (assumed to be 80 percent).

- **Foregone Wages from Plant Closures:**

  Closure of IT firms in the RWBG for transfer to the Khadoury Technology Development Center will result in job displacement and losses. The analysis assumes that 10 percent of Palestinian investment in the KTDC will come from transfers of activity. The result of these transfers on workers welfare will be expressed by an adjustment of their benefits downward by the proportional number of retrenched workers times their average wage net of personal income taxes.

2. Indirect Employment

Direct employment in the Khadoury Technology Development Center will generate indirect employment in the Palestinian economy. This generation of employment will directly result from the added revenue of workers in the KTDC. This revenue will be spent in the Palestinian economy, resulting in employment generated by new growth, net of no KTDC. It is assumed that the indirect employment multiplier effect of direct employment stands at 1.5. This means that for each new job created in the KTDC, 1.5 jobs are added to the economy. It has been assumed that the multiplier effect varies according to skill levels. This is a reasonable assumption, considering the fact that high-skilled workers earn higher wages than low- and medium-skilled workers.

The following multipliers have been given:

a. Unskilled workers: 0.3
b. Semi-skilled workers: 0.5; and,
c. High-skilled workers: 0.7.

- **Disaggregated Benefits and Costs to Wage Income:**

The total labor force benefiting from indirect employment is disaggregated into eight sub-groups, assumed to represent a given proportion of the total employed labor force and assumed to have opportunity costs listed below. These sub-groups represent two categories of employment:

1. Employment in Rest of WBG;
2. Employment in Tulkarem.

No significant internal migration is assumed to take place as a result of the employment opportunities created.

The distribution and shadow prices are as follows:

1. Immigrant workers from Outside WBG (OWBG) employed in Rest of WBG (RWBG):
   . This sub-group is assumed to represent 5 percent of total;
   . Opportunity cost equals total wage earned by the group multiplied by a shadow price factor (assumed to be 80 percent).

2. Formerly unemployed workers in RWBG:
   . This sub-group is assumed to represent 10 percent of total;

- Opportunity cost is zero.

3. Formerly underemployed workers in RWBG:
   - This sub-group is assumed to represent 11 percent of total;
   - Opportunity cost equals total wage earned by the group multiplied by a shadow price factor (assumed to be 40 percent).

4. Workers in RWBG with alternative employment opportunities:
   - This sub-group is assumed to represent 14 percent of total;
   - Opportunity cost equals total wage earned by the group multiplied by a shadow price factor (assumed to be 80 percent).

5. Workers in RWBG who had employment in Israel:
   - This sub-group is assumed to represent 10 percent of total;
   - Opportunity cost equals total wage earned by the group multiplied by a shadow price factor (assumed to be 80 percent).

6. Immigrant workers from Outside WBG (OWBG) employed in Tulkarem:
   - This sub-group is assumed to represent 5 percent of total;
   - Opportunity cost equals total wage earned by the group multiplied by a shadow price factor (assumed to be 80 percent).

7. Formerly unemployed residents of Tulkarem:
   - This sub-group is assumed to represent 10 percent of total;
   - Opportunity cost is zero.

8. Underemployed Residents of Tulkarem:
   - This sub-group is assumed to represent 11 percent of total;
   - Opportunity cost equals total wage earned by the group multiplied by a shadow price factor (assumed to be 40 percent).

9. Residents from Tulkarem who have alternative employment opportunities:
   - This sub-group is assumed to represent 14 percent of total;
   - Opportunity cost equals total wage earned by the group multiplied by a shadow price factor (assumed to be 40 percent).

10. Workers in RWBG who had employment in Israel:
    - This sub-group is assumed to represent 10 percent of total;
    - Opportunity cost equals total wage earned by the group multiplied by a shadow price factor (assumed to be 80 percent).

3. Trained Workers

Workers trained in the Khadoury Technology Development Center enjoy an upgrading of skills which is reflected by a jump from a skill category (for unskilled and semi-skilled workers) to the one immediately above. This jump is accompanied by a wage increase that correspond to the difference between the prevailing national wage for the departure skill level and that for the arrival skill level:

- The average national wage for unskilled labor being set at $1,800 for year 1, and the average national wage for medium-skilled labor being set at $3,600, the wage increase per trained workers corresponds to the difference between the two.
- For skilled labor, the appreciation of wage corresponds to an increase of 30 percent, representing an improvement in real productivity.

Though the training skill level mix will vary over time, the model assumes the following, constant, mix:

a. Unskilled workers: 20 percent;
b. Semi-skilled workers: 40 percent; and,
c. High-skilled workers: 40 percent.

The cost of wage increases to trained labor is represented by the proportional increase in income tax resulting from the jump from one category to another. In effect, the following income tax brackets are assumed. These figures are used for the entire economic analysis, applied to direct and indirect employment:

1. Unskilled labor: 5 percent;
2. Semi-skilled labor: 10 percent;
3. High-skilled: 20 percent; and,
4. Managers: 20 percent.

4. New Employment Resulting From New Enterprise Creation

Palestinian workers in the entire economy will benefit gradually from the increased employment resulting from the creation of new firms fostered by the Khadoury Technology Development Center.

It is assumed that for US$20,000 initially invested, one job is created.

The progressive creation of new employment in the economy is assumed to correspond to the following skills mix:

a. Unskilled workers: 30 percent;
b. Semi-skilled workers: 40 percent;
c. High-skilled workers: 20 percent; and,
d. Managers: 10 percent.

As in the case of the previous job categories, workers employed by the new firms will face costs incurred by their new employment. These will consist of commuting costs and of personal income tax.

- **Incremental Commuting Cost:**

It is assumed that all workers, except those trained in the Center, will face commuting costs to link the regions of WBG they have left to contract employment to their home regions on a regular basis. The assumed incremental cost of commuting for all workers is US$ 100 a year.

Palestinian Private Sector's Cost and Benefits

As stated earlier in the chapter, the Palestinian private sector and the Palestinian economy as a whole will benefit from the Khadoury Technology Development Center through the incremental net profits generated in the center.

Firms within the Palestinian private sector which stand to benefit from the KTDC form three distinct groups:

1. **KTDC investors and operators:**
The profits from these firms will be generated by their location in the Khadoury Technology Development Center. Profits for Palestinian firms in the Center are therefore benefits to be accrued by these firms.

   This category of investment is itself subdivided in two sub-groups:

   a. Greenfield investments:

      Greenfield investment have no opportunity cost, as they result from new investment, net of KTDC. They are assumed to represent 90 percent of total Palestinian investment.

   b. Transfers resulting from closures of operations in the RWBG:

      For KTDC investments resulting from transfers from closures in RWBG, benefits are reduced by the foregone profits from the closed operations. These foregone profits are assumed to be inferior to the long term profits in the KTDC by twenty percent, multiplied by a shadow price factor of fifty percent. This shadow price factor is lower than that used for labor, reflecting the supposition that investor facilities are less mobile than labor. As for opportunity cost of capital, this is handled by the discount rate used to calculate net present value of the balance of incremental benefits over costs net of the no-KTDC case.

      Transfer investment is assumed to represent 10 percent of total Palestinian investment.

   Investments in the Khadoury Technology Development Center will benefit from a number of graduated incentives (see Benchmarking chapter for complete list). The following incentives have been integrated in the economic analysis:

   1. Seven-year corporate income tax holiday for investment in the KTDC;
   2. 10 percent corporate income tax on investment in the following seven years; and,

3. 20 percent corporate income tax afterward.

2. Palestinian firms outside of the KTDC employing workers having undergone training in the center:

It is assumed that Palestinian firms employing workers trained in the Khadoury Technology Development Center will benefit from the increased productivity of these workers. This increased productivity will be translated into increased incremental net profits. Profits are calculated on the basis of the annual wage volume per worker category multiplied by a ‘productivity factor’ corresponding to the output per worker relative to her wage. The following output/wage have been assumed. These ratios represent reasonable assumptions about the wages gains resulting from the increased production-related technical capability of labor. This increased capability affects not simply trained workers, but also has a positive impact on co-workers, as trained workers have a catalytic effect on other workers’ productivity.

1. Medium-skilled labor: 1.7;
2. High-skilled labor: 2; and,
3. Upgraded high-skilled labor: 2.3.

Profits on this productivity gain are set at 70 percent of the total. The reason from this high profit ratio is that the cost of the productivity gains to the companies employing the trained labor are low. In effect, the cost of training is low compared to other productivity-boosting investments. Furthermore, in most cases, workers will pay for part or all of their training.

It is assumed that with the incremental growth in the annual number of workers trained, an increasing number of Palestinian firms will employ KTDC-trained labor. Similarly, an increasing number of KTDC-trained workers will be present in individual Palestinian firms.

Firms employing KTDC-trained labor will, in counterpart to the benefits accrued, face costs directly derived from their use of such labor. The primary cost will be in the form of income tax paid on the net profits resulting from the productivity gains.

3. New Palestinian firms :

The Khadoury Technology Development Center will encourage the creation of start-up firms, both within the Center and outside. The new firms created will benefit from the KTDC primarily through the net profits they will derive from their operations.

As with other firms, new firms will face direct costs, under the form of corporate income tax. In contrast with firms investing in the KTDC, non-investing firms will not be given preferential tax treatment, and will face a flat 20 percent income tax rate.

Palestinian Authority's Cost and Benefits

Corporate income tax incentives are effective cost of the KTDC for transfer investment for the PA, as loses receipt of the normal 20 percent rate on the entire period in the no-KTDC case.

As stated earlier, the Palestinian Authority stands to benefit from the Khadoury Technology Development Center through the fiscal revenues derived from the operations of the Center. The main income item, therefore, is the incremental fiscal impact balance net of the no-KTDC case.

Other economic benefits and costs to the Palestinian Authority include:

- **Economic Benefits of Foreign Exchange:**

  Due to the absence of a Palestinian Central Bank, the Palestinian Authority will not gain economic benefits from foreign exchanges. These benefits will accrue to the Republic of Israel and are therefore not incorporate in this economic impact analysis.

  The analysis consequently ignores the foreign exchange earnings resulting from imports of capital and inputs.

- **Environmental Costs:**

Environmental costs to the Palestinian Authority have been included in the capital investment cost of the KTDC. This investment is included in the fiscal impact analysis.

- **Equity Investment in the Khadoury Technology Development Center:**

  The model assumes that the Palestinian Authority has made no equity investment in the Center.

Scenarios

The same scenarios used to assess the fiscal impact of the Khadoury Technology Development Center are applied to the economic model and analysis:

1. Base Case Scenario: The base case scenario incorporate the conservative assumptions used in the demand analysis and the financial analysis.
2. Reduced Demand Scenario: The scenario models the effect of a reduction in demand of 40 percent compared to the base case scenario. Less demand implies less investment, affecting revenues and profits, and affecting employment. In such case, the reduced demand has consequences on the revenues of the Palestinian Authority, as seen in the fiscal impact analysis.
3. Lower tax Collection Scenario: The scenario models the economic effect on all stakeholders of a decrease of tax collection by 20 percent.

12.4 Results of Economic Analysis

Using the assumptions and scenarios listed in the preceding section, the model has produced the following results. It is noted that for all scenarios, the KTDC produces significant economic benefits that shared in a relatively equal fashion between the three groups identified.

Scenario 1: Base Case

For the base case scenario, economic benefits are important for each stakeholder group and for the entire Palestinian economy. As shown by Table 4.1, the Economic Net Present Value ranges from US$146 million (with a discount rate of 15 percent) to US$

600 million (with a discount rate of 5 percent). The estimated Economic Internal Rate of Return is 43 percent.

For the base case scenario, the 1999 value of the economic benefits of the KTDC over the twenty year period is US$ 1.37 billion.

Figure 4.1 presents a graphic recapitulation of economic returns for each stakeholders group over the twenty-year period.

Figure 4.2 represents the distribution of net economic gains due to the Khadoury Technology Development Center, at a discount rate of 5 percent. The main beneficiary is the Palestinian private sector, with 53 percent of total net economic benefits. The Palestinian Authority (18 percent) and Palestinian workers (29 percent) share the remainder. The high share of the private sector is due to the integration in the analysis of non-KTDC investment resulting from the activities of the Center encouraging and assisting new enterprise creation.

Table 12.1: Summary of Economic Performance, Base Case Scenario, US$

	Discount rate	Workers	Investors	PA	Total
Incremental Economic Net Present Value	5%	$ 173,411,339	$ 321,498,096	$ 105,187,664	$ 600,097,100
	10%	$ 92,783,833	$ 164,383,450	$ 36,009,623	$ 293,176,906
	15%	$ 53,922,778	$ 83,914,917	$ 7,889,795	$ 145,727,489
Incremental Economic Internal Rate of Return					**43%**

Figure 12.1: Balance of Incremental Economic Costs and Benefits, Net of No KTDC, Base Case Scenario

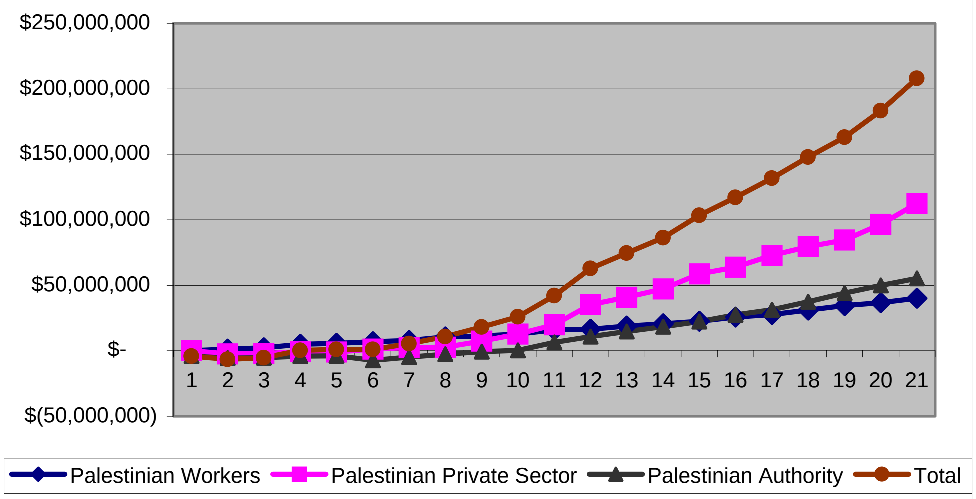
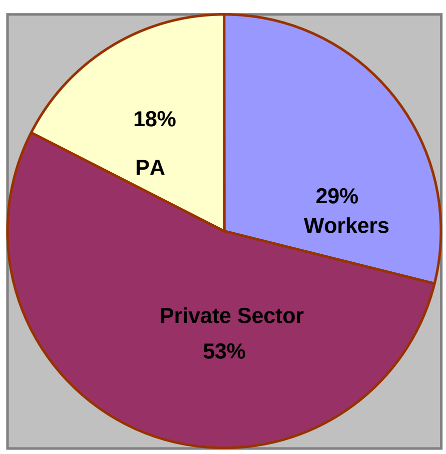


Figure 12.2: Distribution of Economic NPV at Discount Rate of 5 percent, Base Case Scenario



Scenario 2: Reduced Demand

For the reduced demand scenario, economic benefits decrease for all groups involved. The reason for this decrease is the fact that the model assumes a decrease of investment as the primary expression of the decrease in demand relative to the base case scenario. In effect, as a consequence of the assumed 40 percent drop in demand, investment decreases proportionally, affecting employment and impacting on the PA fiscal balance.

As shown by Table 4.2, the Economic Net Present Value ranges from US$120 million (with a discount rate of 15 percent) to US$498 million (with a discount rate of 5 percent). The estimated Economic Internal Rate of Return is 39 percent.

For the reduced demand scenario, the 1999 value of the economic benefits of the KTDC over the twenty year period is US$ 1.14 billion.

Figure 4.2 presents a graphic recapitulation of economic returns for each stakeholders group over the twenty-year period. Figure 4.3 represents the distribution of net economic gains due to the Khadoury Technology Development Center, at a discount rate of 10 percent. The main beneficiary is the Palestinian private sector (60 percent), with Palestinian workers receiving a third of the economic benefit. Under this scenario, the PA's share of benefits decreases to 7 percent. The high share of the private sector is due to the integration in the analysis of non-KTDC investment resulting from the activities of the Center encouraging and assisting new enterprise creation.

Table 12.2: Summary of Economic Performance, Reduced Demand Scenario, US$

	Discount rate	Workers	Investors	PA	Total
Incremental Economic Net Present Value	5%	$ 164,870,013	$ 296,085,752	$ 37,029,767	$ 497,985,532
	10%	$ 87,226,430	$ 154,166,836	$ 1,596,516	$ 242,989,782
	15%	$ 50,062,842	$ 80,731,896	$ (10,941,971)	$ 119,852,767
Incremental Economic Internal Rate of Return					**39%**

Figure 12.3: Balance of Incremental Economic Costs and Benefits, Net of No KTDC, Reduced Demand Scenario

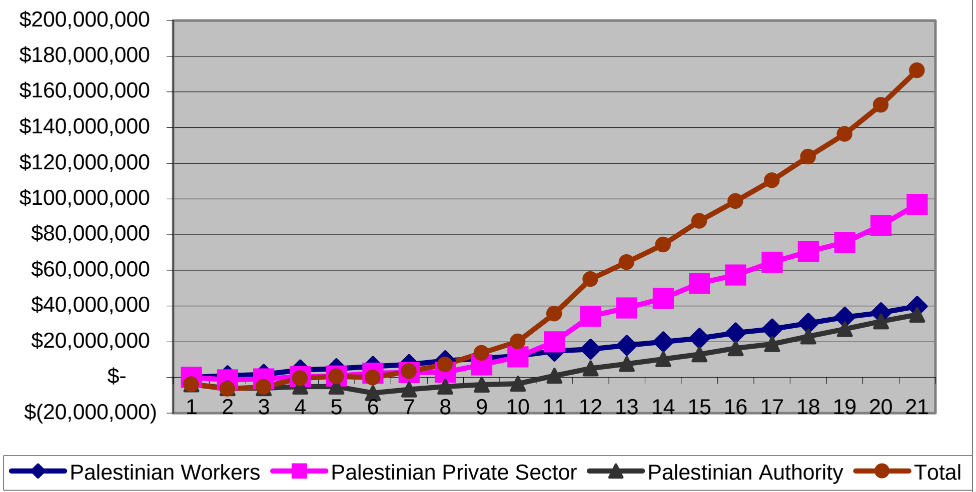
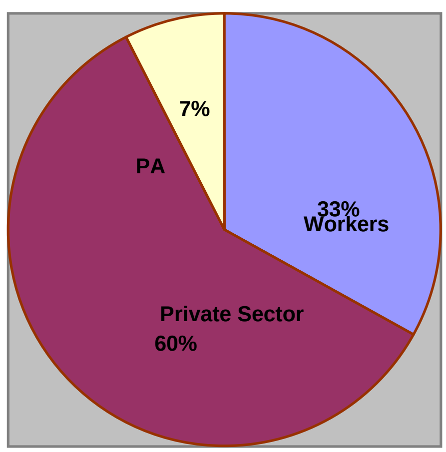


Figure 12.4: Distribution of Economic NPV at Discount Rate of 5 percent, Reduced Demand Scenario



Scenario 3:
Reduced Tax Collection

For the reduced tax collection scenario, economic benefits decrease for the PA and increase for the two other groups. The decrease in tax collection positively affects investors and workers, raising the overall NPV.

As shown by Table 4.3, the Economic Net Present Value ranges from US$138 million (with a discount rate of 15 percent) to US$573 million (with a discount rate of 5 percent). The estimated Internal Rate of Return is 41 percent.

For the reduced tax collection scenario, the 1999 value of the economic benefits of the KTDC over the twenty year period is US$ 1.31 billion.

Figure 4.2 presents a graphic recapitulation of economic returns for each stakeholders group over the twenty-year period.

Figure 4.3 represents the distribution of net economic gains due to the Khadoury Technology Development Center, at a discount rate of 10 percent.

Table 12.3: Summary of Economic Performance, Reduced Tax Collection Scenario, US$

	Discount rate	Workers	Investors	PA	Total
Incremental Economic Net Present Value	5%	$ 175,972,526	$ 345,032,572	$ 51,899,651	$ 572,904,749
	10%	$ 94,109,383	$ 176,415,532	$ 8,861,740	$ 279,386,655
	15%	$ 54,662,847	$ 90,168,306	$ (7,107,605)	$ 137,723,549
Incremental Economic Internal Rate of Return					**41%**

Figure 12.5: Balance of Incremental Economic Costs and Benefits, Net of No KTDC, Reduced Tax Collection Scenario

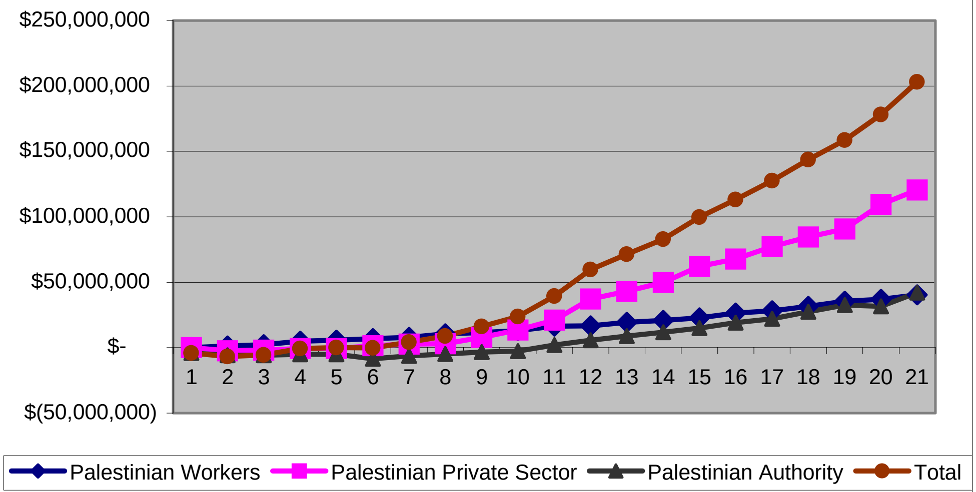
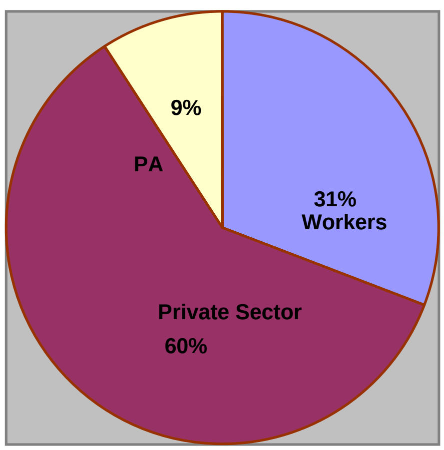


Figure 12.6: Distribution of Economic NPV at Discount Rate of 5 percent, Reduced Tax Collection Scenario



Employment Generation

The Khadoury Technology Development Center is expected to result in the creation of a significant number of jobs in WBG. In addition to direct employment generated by the Center in Tulkarem, the KTDC is expected to create indirect employment in both the Tulkarem region and the Rest of WBG. There will be two types of such employment:

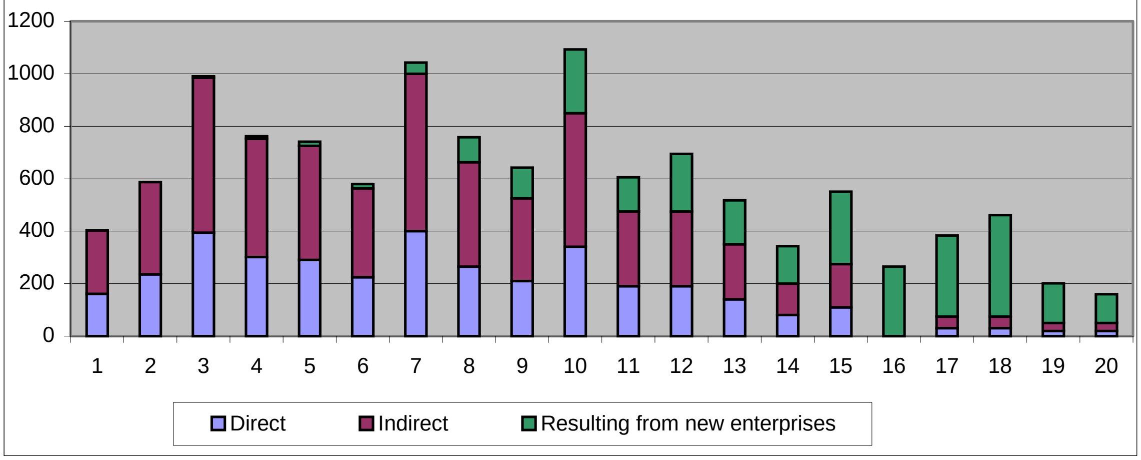
1. Indirect employment resulting from expenditures by workers in the KTDC;
2. Employment resulting from new enterprises.

In addition to employment creation, the KTDC will positively affect the workers trained in the Center, as they will see their wages improve as a direct outcome of the increase in their real productivity.

The contribution of the Khadoury Technology Development Center to employment over the twenty year period is well balanced between Tulkarem and the Rest of WBG. Overall net annual employment creation for the entire economy varies over time. It should be noted that the gross contribution to employment creation overestimates the employment effect of the Center, as it incorporates employment obtained by people who were previously employed and those who were underemployed. The net contribution is therefore a more accurate measure.

As for the relative net employment contribution of the different KTDC-related effects (see figure 4.7), it is noticeable that the relative weight of the KTDC itself peaks in Year 7 and decreases over time. from new enterprises. It is also noticeable that the relative share of employment from new enterprises rapidly expands, particularly after Year 9.

Figure 12.7: Employment, by categories, Whole of West Bank/Gaza, Base Case



13. Fiscal Impact Analysis

13.1 Introduction

The fiscal impact analysis will determine the effect of the Khadoury Technology Development Center on the budget of the Palestinian Authority.

13.2 The Model

The model for the fiscal analysis was developed as part of the economic benefits-costs analysis. The benefits-costs model consists of one spreadsheet workbook, a section of which represents the fiscal impact analysis. Consequently, all assumptions used in the fiscal analysis are shared with the economic analysis.

The fiscal analysis corresponds to the KTDC case because no current budget for the Palestinian Authority, nor any reliable projections, were available to the study team. All figures given, therefore, are net of the no-KTDC case. In common with both the financial and the economic analysis, the fiscal impact analysis uses a 20-year project period.

The model includes individual worksheets with projections for principal components of the fiscal budget.

These components are:

1. **Expenditures:**

   Both current and capital expenditures are projected. It is assumed in the model, following the financial analysis, that the Palestinian Authority, with the exception of land, will make no equity investment in the private components of the Khadoury Technology Development Center.

2. **Income:**

   Income from sources such as taxes, duties, fees, licenses, etc. are projected over the 20-year period. No income from dividends is programmed in the analysis.

3. **Pre-financing Cash Flow:**

   The balance between expenditures and income is summarized here.

4. **Financial Performance:**

   The final key worksheet of the model is one that models financial performance, after any assumed financing. Since no financing is assumed, the balances on these sheets are the same as those presented in the pre-financing cash flow sheet. Net present values of the fiscal balances are calculated.

13.3 Parameters and Assumptions

A number of assumptions have been developed for the analysis of the fiscal impact of the KTDC. These assumptions also apply to the economic analysis. The assumptions used for the fiscal analysis are listed below:

- **Immigration**

  It is assumed that the KTDC will generate immigration through the return of some expatriate Palestinians. Immigrants are assumed to represent 10 percent of the total labor force employed in the KTDC.

  In addition, it is expected that a number of workers currently employed in Israel will find employment either directly with the KTDC or will work for the economic sector resulting from the development of the Center.

  Both phenomena will result in increased income tax revenues for the Palestinian Authority.

- **Wages**

  It is assumed that the Palestinian labor force is divided into three skill sub-groups:

a. Unskilled workers;
b. Semi-skilled workers; and,
c. High-skilled workers.

Each group is subject to an average wage. The national wage used in the economic analysis is calculated as the average wage per skill category, based on data provided in the course of preparatory research, factored by the total Palestinian labor force. Wages are assumed to experience annual growth at constant rates that vary according to skill level. Details are provided in the economic analysis.

Current Expenditures

A number of simplifying assumptions were used to derive projections for PA current expenditures directly resulting from the development of the Khadoury Technology Development Center:

- **Income Tax Department**

  Current expenditures for the department, as for the ministries and departments listed below, have been estimated. It is expected that these expenditures will rise progressively at an annual constant rate of 5 percent over the 20-year period of the analysis.

- **Other Ministries and Departments**

  These include the Ministry of Economy and Trade, the Ministry of Economy, the Ministry of Post and Telecoms, the Ministry of Housing, the Ministry of Public Works, the Ministry of Planning and International Cooperation, the Customs Department, and other agencies.

Capital Expenditures

As with current expenditures, a number of simplifying assumptions were used to derive projections for PA capital expenditures directly resulting from the development of the Khadoury Technology Development Center. Most capital expenditures are conducted through the Center's Public Administration facility, which will raise financing through the mechanism established in the financial analysis.

- **Income Tax Department**

  Current expenditures for the department, as for the ministries and departments listed below, have been estimated. It is expected that these expenditures will rise progressively at an annual constant rate of 5 percent over the 20-year period of the analysis.

- **Other Ministries and Departments**

  These include the Ministry of Economy and Trade, the Ministry of Economy, the Ministry of Post and Telecoms, the Ministry of Housing, the Ministry of Public Works, the Ministry of Planning and International Cooperation, the Customs Department in Tulkarem, and other agencies.

Income

A number of simplifying assumptions are also made on the PA income sheet, which projects revenue sources and level of revenues resulting from the KTDC. These assumptions include:

- **General Sales Tax**

  The KTDC will affect sales tax revenues in a number of ways. First, it is likely to see sales tax revenues be affected negatively by the closure of operations outside of the Center resulting from transfer investment from the Rest of West Bank/Gaza (RWBG) to the KTDC. It is assumed that these transfer represent 10 percent of total Palestinian investment in the Center. On the other hand, the center will positively affect sales tax revenues through the provision of services and products to the Palestinian economy. Sales tax revenues, together with personal and income tax revenues, are expected to generate the vast majority of PA KTDC-related income.

- **Personal Income Tax**

  Personal income tax is calculated on the basis of the distribution of labor and the wage levels referred to above. The following income tax rates have been estimated:

  a. Unskilled workers: 5 percent;
  b. Semi-skilled workers: 10 percent; and,

c. Skilled workers and managers: 20 percent.
Income tax revenues are calculated for wages resulting from direct employment, indirect employment, wage increases resulting from training in the KTDC, and employment generated by new enterprises. For full explanation of these employment categories, please refer to the economic analysis in the following chapter.

For all employment created as a result of the development of the KTDC it is assumed that there will be a level of workers displacement impacting income tax revenues. In addition, income tax revenues resulting from workers who were previously underemployed and employed will not be considered net revenues, but will be applied an appropriate shadow price. The analysis will include as net revenues those which are derived from previously unemployed workers, immigrant workers, and workers who used to be employed in Israel and now contribute to the PA income tax revenue.

- **Corporate Income Tax**

Corporate income tax revenues are calculated on the basis of the profits derived from KTDC-related operations or KTDC-resulting operations. Such is the case, for example, for enterprises created as a result of KTDC operations. The corporate income tax calculation for KTDC investors incorporates the tax incentives offered to investors, with a gradual increase from 0 percent to the regular 20 percent rate. Operations closure due to transfer investment from the RWBG to the KTDC – which represents 10 percent of total incremental Palestinian investment – will constitute a revenue loss for the PA. This has been calculated on the basis of the estimation of profit losses resulting from these closures. This loss is not simply the result of these profit losses. They are also the expression of the fact that transfer investment will not pay the normal 20 percent tax rate until after an initial period of 14 year. This revenue loss is therefore only partially compensated over time.

- **Other income**

No other major source of income for the Palestinian Authority has been included in the model, which is a conservative assumption.

Scenarios

Three scenarios used to assess how changes in a number of assumptions would affect the fiscal impact of the Khadoury Technology Development Center. These scenarios are used in the economic analysis:

1. Base Case Scenario: The base case scenario reflects reasonably conservative assumptions, including those listed above.
2. Reduced Demand Scenario: The scenario models the effect of a reduction in demand of 40 percent compared to the base case scenario. Less demand implies less investment, affecting tax and non-tax revenues. In such case, the reduced demand has consequences on the revenues of the Palestinian Authority.
3. Lower tax Collection Scenario: The scenario models the economic effect on all stakeholders of a decrease of tax collection by 20 percent.

13.4 Results of Fiscal Analysis

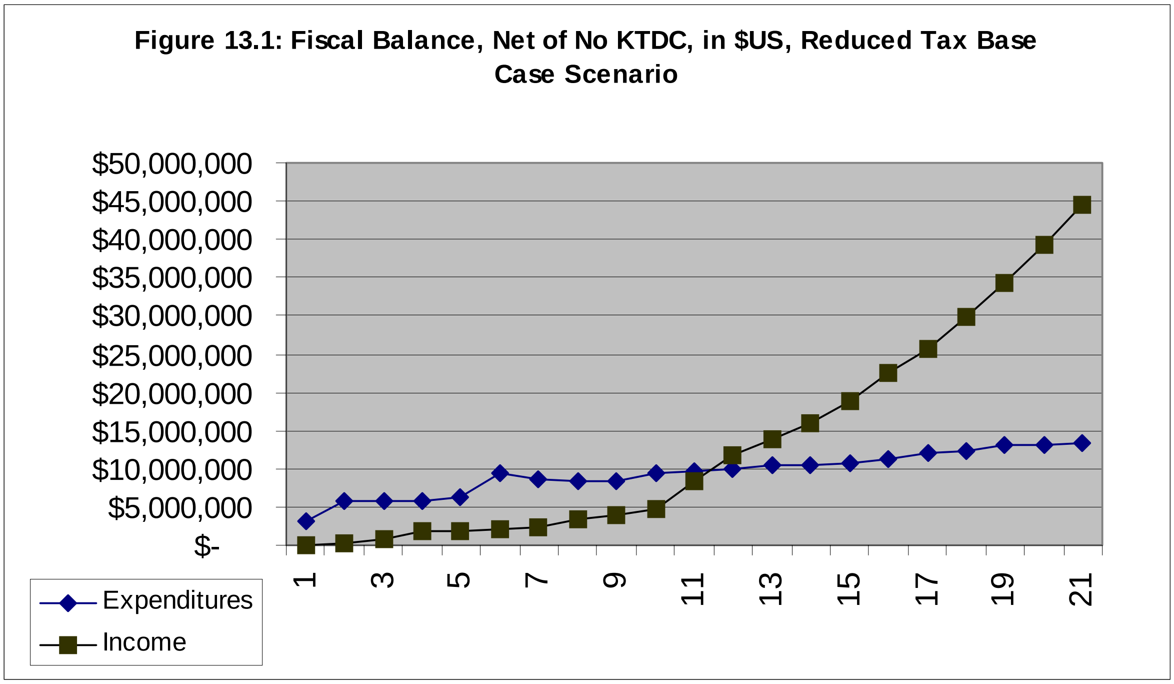
Scenario 1: Base Case

Based on the assumptions listed in the dedicated section above, the fiscal analysis produced the following result:

For the base case scenario, the impact of the KTDC on the Palestinian Authority is extremely positive, as shown in Table 3.1 below. In effect, the NPV of the KTDC fiscal impact shows, at a discount rate of 5 percent, a benefit of more than US$ 109 million.

Table 13.1: Summary of NPV of KTDC Fiscal Impact, Net of No-KTDC, in $US, Base Case Scenario

NPV, net of no KTDC, at a discount rate of:	5%	$109,312,046
	10%	$38,483,773
	15%	$9,589,911



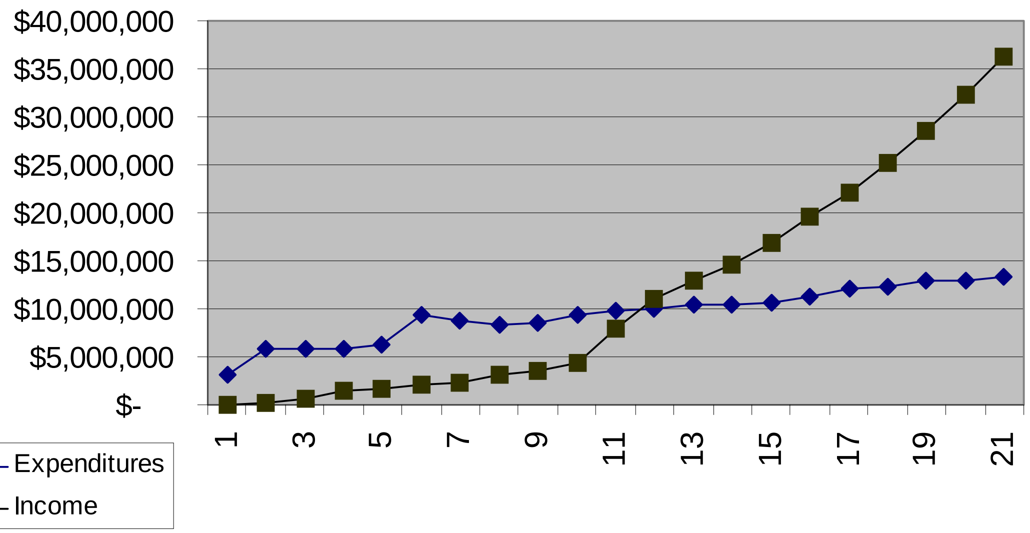
Scenario 2: Reduced Demand

For the reduced demand scenario, the revenue of the Palestinian Authority is significantly affected by the drop in the demand for the KTDC. The NPV becomes negative at a discount rate of 15 percent. At a discount rate of 5 percent, the NPV of the KTDC fiscal impact on the Palestinian Authority is $41 million, or 38 percent of the base case.

Table 3.2: Summary of NPV of KTDC Fiscal Impact, Net of No-KTDC, in $US, Reduced Demand Scenario

NPV, net of no KTDC, at a discount rate of:	5%	$41,154,149
	10%	$4,070,667
	15%	($9,241,855)

Figure 13.2: Fiscal Balance, Net of No KTDC, in $US, Reduced Demand Scenario



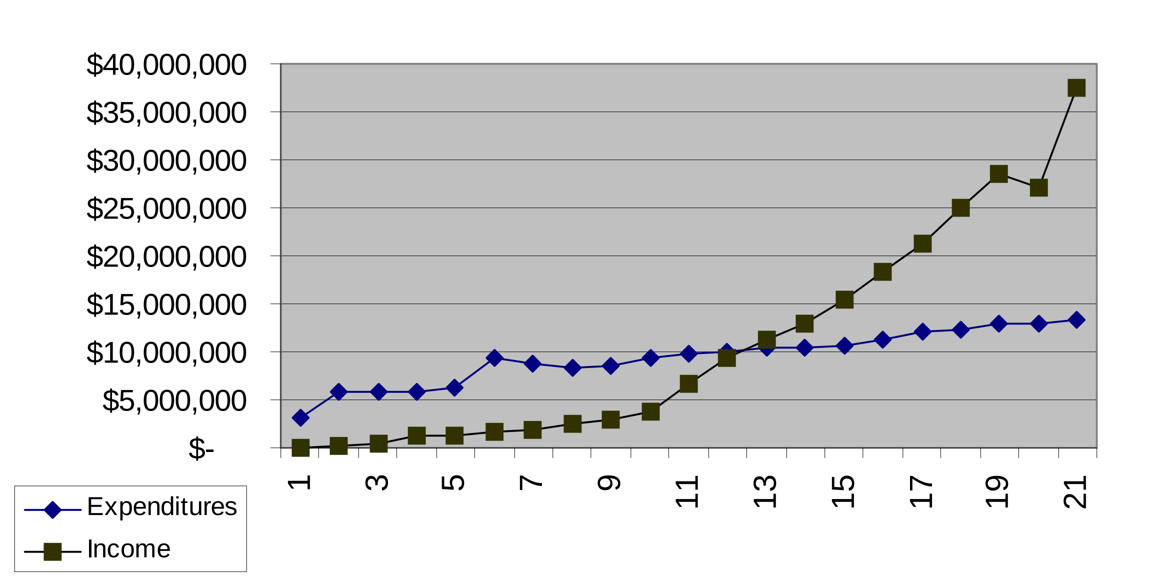
Scenario 3: Reduced Tax Collection

For the reduced tax collection scenario, the fiscal performance of the KTDC case is marginally better than the reduced demand case, but still significantly inferior to that of the base case. The reason for this performance is the fact that the overall performance of the KTDC remains the same as for the base case. Economic activity, measured by the economic benefits gained by the stakeholder groups, is not affected by the decrease of tax collected. In fact, it would be safe to assume that a decrease in tax collection, for any given reason, would positively affect economic actors and therefore boost economic activities. This boost in economic activity would in turn positively affect state revenues, even with a tax collection that remains imperfect. However, the NPV remains negative at a 15 percent discount rate.

Table 3.3: Summary of NPV of KTDC Fiscal Impact, Net of No-KTDC, in $US, Reduced Tax Collection Scenario

NPV, net of no KTDC, at a discount rate of:	5%	$56,024,033
	10%	$11,335,890
	15%	($5,407,488)

Figure 13.3: Fiscal Balance, Net of No KTDC, in $US, Reduced Tax Collection Scenario



14. TCD Implementation

14.1 Overview

The Khadoury Technology Development Center is a complex project, striving to bring together many different actors in a common cause. The prime mover behind the entire initiative will be the Khadoury Technology Development Center Administration. As indicated in Chapter 9, KTDCA will have several sponsors and shareholders, and the immediate founding of the KTDCA is the most important single action that will contribute to the success of the project.

A second factor of success will be the full participation of the supporting national institutions, and the agreement among the parties that strenuous efforts will be made to ensure full participation by the private sector.

All other actions follow from this. The proposed implementation plan is described in Figure 14.1 below. A brief commentary follows.

14.2 Physical Planning

While this Feasibility Study outlines the major thrusts that the physical plan for the KTDC should take, further detailed studies are needed before development can begin. Although the geological conditions on the site are reasonably well known, this aspect needs to be finalized once the final layout of the site is determined.

Land assembly should continue and moves continued to have the DCO relocated. The Land should be transferred into the name of the KTDCA.

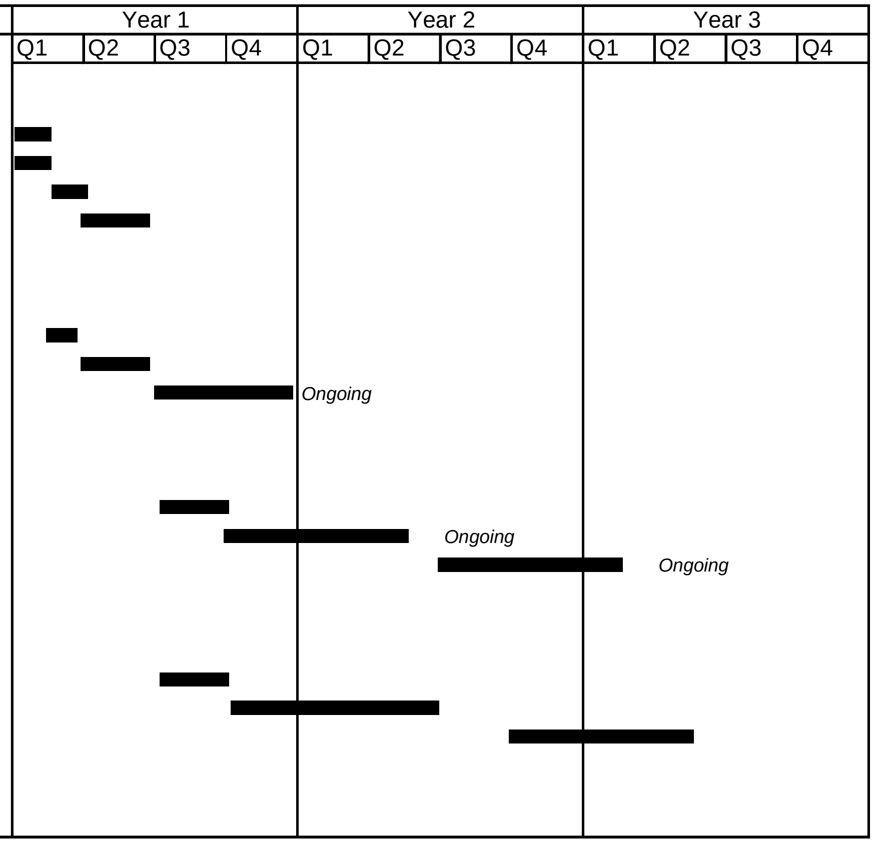
Finally a tender package for the KTDCA financed site development works should be drawn up based on detailed designs, and the tender let for public bidding.

Figure 14.1 – Implementation Plan

Khadoury Technology Development Center, Tulkarem

Implementation Plan

Action	Responsibility
Physical Planning	
Form KTDCA	PIEFZA
Land Transfer	PNA
Detailed Design Studies	KTDCA
Develop 5 ha site	KTDCA
Marketing	
Prepare prospectus	KTDCA
Find Developer	KTDCA
Market to tenants	KTDCA/Dev
Institutional Development	
Convene Educational Inst.	KTDCA
Form HR and Innovation Groups	All
Form linkages	All
Infrastructural Development	
Form Telecoms consortium	PALNET/TBD
Prepare business plan	Consortium
Install added value services	Consortium



14.3 Marketing

The KTDC has already proven itself to be an attractive project to end users. However, marketing to property developers is a different matter, especially in a relatively unproven concept in West Bank/Gaza. This is why it is so important to use the outputs of this study to prepare a prospectus for potential developers. Once public commitment to funding the project is secured, this is a strong signal to the private sector that the project will really proceed as planned. However, it may take as long as a year to secure a deal with a private developer. This time can still be used profitably in preparing the concept and the institutions, and in preparing marketing packages aimed at tenants.

14.4 Institutional Development

The linkage between the existing educational institutions on site, the national institutions that are going to be involved in the KTDC, and the other players in the KTDC will need to be carefully managed if the KTDC is not to become just another arm of government with lack-luster performance.

The most successful Science Parks have all enjoyed a dynamic and innovative institutional framework, where new ideas and concepts are entertained and acted upon. The bridge between industry and academia is not always easily managed, so the action items under this heading require a strong champion who has the respect of both the academic and industrial communities.

14.5 Infrastructure Development

Clearly, the resolution of all infrastructure problems on site is important, but the most critical item from a long term perspective is the provision of fast and cheap high-quality telecommunications services on site. This will enable the KTDC to “leap-frog” over the competition, and to take full advantage of its strategic position close to the electronics industry in Israel.