DESIGN of PUBLIC SUPPORT for R&D:
A STUDY of TURKISH TECHNOPARKS

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Abstract

We report on and examine the consequences of the Turkish experience with public support for science/technology parks (STPs). The Turkish government has been supporting STP development through a 2001 legislation that provides significant tax exemptions for tenants of STPs established according to its mandate. While the law has been successful in encouraging more than twenty STPs to be established, and getting more than 800 firms to move to STPs by 2007, it also has had some unintended consequences that seem to work against fulfillment of the full intention of the law. Using archival data collected by the Ministry of Trade and Industry, survey data collected from STP managers, and in-depth interviews with STP managers, tenants, university administrators, and other actors involved in STP governance, we report on the overall tenant population of STPs in Turkey and some practices and outcomes that are relevant for assessing the impact of the public support on R&D. The data at hand point to some significant progress being made as well as some shortcomings.
We report on and examine the consequences of the Turkish experience with public support for science/technology parks (STPs). The Turkish government has been supporting STP development through a 2001 legislation that provides significant tax exemptions for tenants of STPs established according to its mandate. While the law has been successful in encouraging more than twenty STPs to be established, 15 of them operational by 2006, and getting more than 800 firms to move to STPs by 2007, it also has had some unintended consequences that seem to work against fulfillment of the full intention of the law.

Specifically, we find a dominance of IT and software firms in STPs despite a desire to attract tenants that have more organic links to university projects run by university faculty. We also find preliminary evidence that STPs are less hospitable to start-ups relative to established and larger firms. Moreover, some tenants complain that the regulatory structures put in place to monitor the implementation of the law limit the fostering of an innovative and entrepreneurial spirit in STPs.

In this paper, we use archival data collected by the Ministry of Trade and Industry, survey data collected from STP managers, and in-depth interviews with STP managers, tenants, university administrators, and other actors involved in STP governance to report on the overall tenant population of STPs in Turkey and some practices and outcomes that are relevant for assessing the impact of the public support on R&D. In the next section, we begin by outlining the legislation and its implementation. We then describe the STPs established in accordance with the law and their tenant populations.

**Public support for STPs**

The Turkish law supporting STPs states as its purpose the development of regional clusters of knowledge-intensive firms around universities to foster university-industry linkage and thus facilitate the commercialization of knowledge generated in universities and the production of high value added products and services by local firms. Towards this end, it gives support in the form of tax subsidies for tenant firms as well as providing channels for start-up credit to universities and other research centers that designate a geographic area to establish STPs with any other institutions or organizations they may partner with.

The tax breaks that have been the focal attraction of the law include exemptions from corporate and value added tax on income generated by R&D activities and exemptions from income tax for R&D personnel working within the boundaries of the STPs. The original law passed in 2001 limited the tax breaks to the first five years after a tenant joined an STP. The law was then amended in 2003 to extend tax breaks to all tenants until 2013. The law is flexible with respect to the kind of tenants to be served and does not specify any requirements other than that only R&D activities of tenants will be supported by subsidies.

The law places the role of management in the hands of private firms (instead of the universities themselves or any state agency) that are to be governed by partners of the STP. It also requires that these management firms monitor their tenants to make sure that they do not take unfair advantage of the law.

Tax breaks given to enterprises in STPs is not unique to Turkey, though Turkey’s legislation appears to be among the more generous ones in terms of the broad range of firms that can benefit and the period of time. For instance, China applies a two-year income tax exemption for newly-established firms in technology parks. Poland’s national technology policy permits businesses within STPs to enjoy some tax breaks, but only in terms of exemptions on profits and property (investments in plant and equipment) rather than on direct income (Deregowska, 2002).
In general, however, public support for R&D activities of private enterprises is more heavily geared towards grants and contracts rather than tax subsidies. Davis and Tunny (2005) report that many European countries do not provide indirect support for R&D in shape of generous tax concessions; rather, they provide direct support such as grants and contracts with private sector in their R&D laws and regulations. Although OECD’s Science, Technology and Industry Outlook Report (2006) points to a recent innovation policy change towards more tax reliefs in general, no such particular trend is foreseen for technology parks. Such tax breaks are generally designed for special economic zones or similar initiatives, but not for STPs. In contrast, in most OECD countries, technology incubators and parks are considered successful when they generate tax revenue. OECD Report on Technology Incubators (1997) states that taxes paid by tenants is one of the major criteria for evaluating the impact of technology incubators and parks.

According to OECD Reports (2006, 2007), even though there is an increasing trend for tax reliefs on R&D, several countries still make a distinction between large and small firms and encourage small ones more generously (e.g. Canada, Netherlands). A number of European countries do not use tax incentives for R&D at all, including some with high levels of business R&D investment. Germany does not use tax incentives to stimulate corporate R&D investments, but improving the overall fiscal framework for innovation is a major priority of the federal government. Finland, Iceland, Sweden and Switzerland have also refrained from implementing R&D tax incentives, as has New Zealand (OECD, 2006).

Thus, the Turkish case presents a slightly different route to supporting R&D. It is more aggressive than most policies implemented in developed countries, possibly due to Turkey’s perceived underdevelopment in high technology sectors. R&D expenditure as a percentage of GDP was .64 in Turkey in 2001, the year the legislation came out (OECD, Eurostat). This implies a lot of catching up to reach, for example, the 3% goal for 2010 set at the Barcelona Summit in 2002 by European governments. Moreover, like other countries lagging behind in R&D expenditures, the greater role that the government plays in investing in R&D is not surprising. Developmental support from the government is seen as essential in a country where the private sector is seen as unable and unwilling to invest in long term projects.

In our interviews, we found that most parties regard the Turkish legislation as progressive in its flexibility in extending tax subsidies to all kinds of R&D activities and having them be administered in a decentralized fashion by STPs run by private firms and governed by mostly non-public actors.

**STPs in Turkey**

There are 23 STPs established so far in Turkey, and 15 of them are operational. In accordance with the 2001 law, all STPs are affiliated with a university or a research institute. Universities are the leading partners of STPs in all but three cases, through their foundations. While the ownership structures of STPs vary, they all have a mix of private, public, and non-governmental partners. Chambers of commerce or industry follow universities as the second most common partners. Private firms, banks, and other private sector organizations are among the least common partners with the smallest shares, along with R&D and technology focused foundations and associations. All STPs are run by private companies overseen by a board of directors comprised of representatives of the partners.

In our survey of STP managers, to which 14 of the 15 operational STPs responded, we found that almost all of the STPs have three main goals: 1) improving university-industry collaboration; 2) commercializing new technologies; and 3) supporting information and
technology based entrepreneurship. Developing or fostering the development of local industries is another objective stated by some STP managers.

While their goals are largely the same, we found STP founders and managers we interviewed to have or to have had different strategies. Some chose to focus on as few as two or three sectors, hoping to attract a critical mass of firms in each sector. Others did not have any sectoral preferences but tried to attract multinational firms’ R&D departments in one case, or tenants that already had strong links to university faculty in another case.

One clear outcome of the law has been that the tax incentives have proven to be so strong that there has been great demand for office space in STPs. Almost all STPs that became operational before 2006 are operating at full capacity and have waiting lists of applicants. While this gives STP partners an incentive to increase capacity and focus on real estate development, we find this not to be the dominant outcome. STPs have grown gradually and most have enough room to grow substantially more if they wanted to.

**STP services**

In our survey, we found STP managers perceive the benefits they provide to their tenant firms, in order of the importance tenants place on them, as follows: 1) opportunity to collaborate with a university; 2) opportunity to benefit from tax exemptions and tax breaks; 3) good location; 4) prestige; 5) relations and collaborations with other tenant firms; 6) infrastructure; and 7) business support services. Opportunity to work with STP partners and direct financial supports are perceived as the least important factors in attracting tenants.

STPs offer some consultancy and technical services to their tenants. All STPs we surveyed provide office space and meeting/conference rooms to their tenants. Laboratories, high-speed internet access, library, and cafeteria/restaurants are among the other infrastructural opportunities that are widely provided. Some other important service categories and number of STPs providing them are presented in Table 1. However, in our interviews with managers and tenants, we found out that even if STPs report to provide some services (especially business development functions such as helping with networking among tenants, help with access to investors, potential mentors, clients, and strategic partners), they do not necessarily provide them to all tenants on a systematic and regular basis.
Table 1. Services provided to tenant firms

<table>
<thead>
<tr>
<th>Services</th>
<th># of STPs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Help with manufacturing practices, processes and technologies</td>
<td>6</td>
</tr>
<tr>
<td>Help with basic business issues</td>
<td>10</td>
</tr>
<tr>
<td>Help with reaching potential customers</td>
<td>7</td>
</tr>
<tr>
<td>Help with accounting and financial management</td>
<td>8</td>
</tr>
<tr>
<td>Staffing of top management team</td>
<td>0</td>
</tr>
<tr>
<td>Staffing of other personnel</td>
<td>4</td>
</tr>
<tr>
<td>Finding strategic partners</td>
<td>6</td>
</tr>
<tr>
<td>Promoting relationships with other tenants</td>
<td>14</td>
</tr>
<tr>
<td>Reaching university researchers</td>
<td>12</td>
</tr>
<tr>
<td>Public support</td>
<td>8</td>
</tr>
<tr>
<td>Investment based on share ownership</td>
<td>0</td>
</tr>
<tr>
<td>Reaching to business angels, venture capital, or seed capital investments</td>
<td>5</td>
</tr>
<tr>
<td>Help with reaching commercial bank credits</td>
<td>3</td>
</tr>
<tr>
<td>Help with applying for KOSGEB* supports</td>
<td>9</td>
</tr>
<tr>
<td>Entrepreneurship trainings</td>
<td>7</td>
</tr>
</tbody>
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*Small and Medium Industry Development Organization

10 of the STPs have stated that they provide their services free of charge. One third of the parks reported partially charging the tenants for their services.

**STP monitoring**

One unintended and possibly negative consequence of the law appears to be the conflict between the mandates given to STP managers to both facilitate an entrepreneurial environment that facilitates innovation and creativity and to monitor the implementation of the law. STP managers are required by law to make sure that their tenants comply with the requirement that R&D personnel work on the premises if they want to benefit from income tax breaks. A complaint that was raised in almost all STP tenant interviews was that close monitoring of their entrances and exits is inappropriate, especially for firms that work with clients or those that install and customize their products for customers.

Most STPs use modern versions of punch-card systems, such as turnstiles with ID card readers, cameras to make sure people do not use each other’s cards, and even facial recognition software. Some are reported to try to accommodate tenants by turning a blind eye when employees use each others' ID cards. In any case, this kind of monitoring appears to be at odds with providing a favorable work environment for self-motivated engineers and researchers who sometimes work at irregular hours and who often need to work with their clients.
**Tenant Populations**

The average number of tenants that a park hosts is 52 (64, if we exclude the smallest three STPs founded in 2006), and their average capacity utilization rate for 2006 is 78%. On average, 52% of the tenant firms operate outside the technology park as well as within it. If we classify these firms as having either their headquarters or branch offices within the park, it is observed that 41% of the establishments are branch offices of the firms that have moved their R&D activities to an STP. The size distribution of tenant establishments in STPs is shown in Figure 1. Firm units within STPs are quite small. However, a significant number of these units are branch offices affiliated with a central office outside the park.

**Figure 1. Distribution of tenant firms in Turkish STPs by size**
The sectoral distribution of firms (Figure 2) points to a dominance of software and IT sectors: they constitute 59% of all tenants in 2007. Furthermore, software and IT firms constitute the biggest sector in every STP.

The focus on IT and software

According to a survey of International Association of Science Parks (IASP) conducted in 2006 and 2007, software ranks fourth among technology sectors, both in Europe and worldwide. Given that Turkey is not a major software exporting country, this brings to mind the question of why software firms occupy a major share in Turkish STPs.

We believe that the domination of IT and software firms in Turkey is an unintended consequence of the legislation. The exemption from income tax of R&D personnel working in STPs (the only such example to our knowledge) has meant that firms with labor-intensive R&D processes find STPs to be relatively more attractive. This had not been an intent of the law. Nevertheless, it led IT and software firms to dominate the applicant pool to STPs.

STPs in general did not discriminate against IT and software firms. While only one of them (Cyberpark of Bilkent University) explicitly sought software firms, the rest either had no policy about sectoral preference or had difficulty attracting firms in other sectors relative to the willing software firms.

We believe the domination of IT and software firms to have been exacerbated due to relatively high rents in some STPs. Indeed, an analysis of software and IT firm proportion of STPs and their rental rates reveals that the five STPs with the highest rents are also the ones with the highest proportion of software and IT firms among all.
Moreover, the low fixed cost investment requirements of IT and software firms could also have contributed. Given that they do not require laboratories and other such special plants, it is easier for these firms to move to a new location.

The consequences of this uneven sectoral distribution are less clear. While the benefits for the software industry are still to be assessed, there are those who are concerned that the attraction of IT and software firms to STPs indicates an unfair advantage that they derive from the tax subsidies. All software development activities (up to the development of an end product) come under the rubric of R&D whereas firms in other sectors can only write-off activities up to the production of a prototype from their tax returns. This is because the R&D process and prototype development is not separated from final product development in software and IT sectors as in others. Thus, some observers worry, once IT and software firms are located in an STP they get shielded from competition with comparable firms outside of STPs.

By the same argument, IT and software firms also have unfair advantage over firms in other sectors. In addition to worrying about unfair treatment, one concern is that the intent of the law is not being served when some IT and software firms get tax breaks for implementing solutions to specific and clear problems instead of developing novel solutions to harder, more basic problems.

Besides this concern about fairness in distribution of public support, we believe there are also possible negative consequences for STP development. Because IT and software firms do not require substantial investments in laboratories and equipment, they may have lower demand for collaborations with university faculty. In fact, IT and software firms are observed to be less likely to seek consultants or project partners among university faculty. Therefore, we investigate the possible consequences of this prevalence of IT and software firms for the development of university-industry linkages and the fostering of relationships among tenant firms and accordingly, we aim to report on these issues in the final version of our paper.

Start-ups versus older firms

Three of the STPs have government-run incubators on their premises, though one of these established organic links with the incubator, providing access to tax subsidies to incubatees, only recently. Other than one more STP that established its own low-rent facilities, STPs in general have not sought to target start-up firms.

Still, 25% of all tenants of the nine STPs (not including tenants of government-run incubators) we have data for are start-ups. The proportion in each STP ranges between 0 and 63%. One question we hope to investigate in future research is whether start-ups have more relationships with universities.

Conclusion

The goal of creating agglomerations around universities is at least partially met with 780 firms currently located in 14 STPs, most of them on university campuses. It is too early to assess the spillovers created in these regions, and whether the local and national economy will benefit from the STP policy. In this paper, we have reported some problems perceived by various constituents, and how these problems arose as unintended consequences of a law that is generally accepted to be well designed and sufficiently flexible.

One source of problems is that the law appears to provide too strong an incentive for firms to join STPs, especially if they are in labor-intensive sectors like IT and software
Some interviewees complained that with the high demand from tenants, STPs have admitted tenants who do not pose any risks of defaulting on their rents, those that already have enough income to pay the higher rates and not necessarily the most innovative firms, or the ones that need government support for long term projects. Some tenants that were not happy with the facilities available at their STPs attributed this to strong demand from prospective tenants not giving STP partners and managers any hard incentives to see their tenants succeed as innovators.

We have also observed in our survey of STP managers and our interviews with them, however, that STP managers have been learning about the needs of their tenants and how to serve them better. The older STPs are doing better and the newer ones are catching up, as managers get more adept and as tenants become more demanding.

The concern with making sure legal support is not exploited has had unintended consequences as well. Close monitoring of time R&D personnel spend at the STP is not conducive to creating a flexible environment that will support innovative personnel and activities. R&D personnel do not feel free to come and go as they please, knowing that the time they spend working over the weekends or at the clients’ office are not rewarded as much monetarily as the time they spend at the STP. Moreover, the practice seems to breed mistrust between STP management and tenant firms and among tenant firms.

Another source of complaints from third parties has been the dominance of software and IT firms among STP tenants. Some perceive this as creating an unfair advantage for these firms over other firms in the sector that are not located in STPs and over tenants of STPs in other sectors. Through a survey of tenants and closer analysis of archival data, we hope to understand whether the dominance of software and IT firms hurts the development of inter-firm linkages in STPs and links between firms and universities.

We believe the Turkish experiment with public support for STPs will continue to provide a rich ground for studying STPs in general as a new Turkish law that became effective on April 1, 2008 extends public support for R&D activities to firms with more than 50 R&D employees even if they are not located in STPs. This will make STPs less attractive for bigger firms, pushing STPs to try and attract tenants through their services and opportunities for collaboration rather than being able to rely largely on tax incentives. We hope to study the impact of this law through a survey of tenants we are conducting now and a comparison of before and after effects evident in archival data.
References


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