INNO-Policy TrendChart –

Innovation Policy Progress Report

Israel

2009

European Commission
Enterprise Directorate-General

PREFACE

Innovation is a priority of all Member States and of the European Commission. Throughout Europe, hundreds of policy measures and support schemes aimed at innovation have been implemented or are under preparation. The diversity of these measures and schemes reflects the diversity of the framework conditions, cultural preferences and political priorities in the Member States.

PRO INNO Europe® is an initiative of Directorate General Enterprise and Industry which aims to become the focal point for innovation policy analysis, learning and development in Europe, with the view to learning from the best and contributing to the development of new and better innovation policies in Europe. Run by the Innovation Policy Directorate of DG Enterprise and Industry, it pursues the collection, regular updating and analysis of information on innovation policies at national and European level.

INNO-Policy TrendChart serves the "open method of coordination" approach laid down by the Lisbon Council in March 2000. It supports policy makers and innovation support measure managers in Europe by providing summarised and concise information and statistics on innovation policies, performances and trends. It is also a European forum for benchmarking and the exchange of good practices in the area of innovation policy.

INNO-Policy TrendChart products

INNO-Policy TrendChart, previously the TrendChart on Innovation, has been running since January 2000. It currently tracks innovation policy developments in all 27 EU Member States, plus Iceland, Norway, Switzerland, Croatia, Turkey, Israel, Brazil, Canada, China, Japan, USA and India. The INNO-Policy TrendChart website[1] provides access to the following services and publications, as they become available:

- a database of innovation policy measures in the 39 countries;
- a news service and related innovation policy information database;
- annual policy monitoring reports for all countries covered;
- the European Innovation Progress Report, an annual synthesis report bringing together key points in the INNO-Policy TrendChart.

This document has been prepared within the framework of an initiative of the European Commission's Enterprise and Industry Directorate-General, Innovation Policy Development Unit. Official responsible: Cesar Santos (Cesar.SANTOS@ec.europa.eu).

The present report was prepared by Yaacov Fisher and Michael Eilan of I-Biz (fisherya@i-biz.co.il / michael.eilan@gmail.com.) The contents and views expressed in this report do not necessarily reflect the opinions or policies of the Member States or the European Commission.

The report covers the period July 2008 to June 2009.

[1] See http://www.proinno-europe.eu/index.cfm?fuseaction=page.display&topicID=52&parentID=52

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The effect of the global economic crisis hit Israel later than most industrialised economies and was to a certain extent ameliorated by continuing stability in the banking sector and no drastic drops in real estate prices.

The economy, however, depends on exports which dropped sharply starting in the 2nd quarter of 2008. The effects of this trend were exacerbated by the weakness of the US dollar causing a sharp decrease in profitability and forcing many firms to shut down. Unemployment figures started to rise in the last quarter of 2008 and the forecast is for increasing unemployment till the end of 2009 even though there are many indicators demonstrating that the crisis may be bottoming out.

The strongest indicator of lower economic activity was in government tax revenues which started declining at the start of 2008 which in turn caused the 2008 budget to show a 2.8% of GDP deficit after reaching a balance in 2007. The general election of February 2009 led to the election of a new coalition government that had no approved budget for the year. The budget was finally approved in July 2009 for two years and is forecasting a 6% of GDP deficit in 2009.

One of the main concerns at the beginning of 2009 was the state of leverage among Israel's largest conglomerates, many of whom were heavily exposed to real estate markets abroad. This concern has considerably reduced to a certain extent since most the conglomerates disposed of assets and because of substantial increases in the Israeli stock market in the first half of 2009.

The effects of the crisis on the innovation system were very fast: The public markets for IPOs on NASDAQ and the Tel Aviv Stock Exchange effectively shut down and funding of start-ups by venture capital contracted immediately. It is clear that the crisis will also limit the capacity of local VC firms to raise new funds but there is insufficient data to measure the exact effect yet.

Main developments in public support for innovation

There were two main developments in public support for innovation during the period under review. The first was a decision in Q4 2008 to increase the 2008 budget of the Office of the Chief Scientist (OCS) in the Ministry of Industry, Trade and Labour (MITL). The extra funds were disbursed immediately and a similar increase was added to the 2009 budget. There is no data with which to asses the effectiveness of this quick response, but data from the 2008 OCS report indicate much larger funding for smaller firms, meaning that it is fairly likely that the extra funding helped some smaller R&D intensive firms survive while keeping R&D programmes underway.

The second major change in innovation policy was the announcement that the government would join a dedicated VC fund for life sciences and biotechnology. This government decision to enter the private equity market, results from a clear and evident market failure of innovative firms in these industries, despite years of consistent support by the OCS. The final terms of the fund will only be published in September 2009, but the government, in a joint declaration of intent by the OCS and the Ministry of Finance, announced that it would offer other limited partners in the new fund a certain as yet unspecified level of insurance against possible losses as well as profit sharing with the government's share on potential revenue from the fund. This is the first time since 1991 that the government is entering the private equity market after it successfully launched the Israeli VC industry with the establishment of the Yozma fund at the time.

Israeli policy makers focus nearly entirely on industrial innovation. Other aspects of the innovation system such as research in universities or thematic research sponsored by the government did not enjoy any increases in their budget, and there are indications that in actual fact, the budgets for research and higher education, which were increased somewhat in 2008, will decline slightly in 2009.

Appraisal of national innovation policy

Research cited in section 3.3 of this report shows that the OCS is contributing in a highly effective manner to economic growth, with a large measure of additonality: specifically, every NIS 1m of funds given by the OCS to firms caused them to invest an additional NIS1.28m of their own funds in R&D projects - these firms would not have invested these funds had it not been for OCS support. Furthermore, the spillover economic effects from this support reached 4.7 times the level of government support among those firms that have received most support from the OCS over the years.

The OCS has a stable and relatively quick delivery system, and reviews of its performance have not called for any changes in a system that works well.

However a broader appraisal of challenges faced by the innovation system by the authors of this report and supported by findings of a distinguished panel cited in section 3.1 shows that the same intense focus on industrial innovation that worked so well for so many years may have ignored substantial threats to the innovation system. Chief among these is the continuing crisis in higher education, which is threatening both the country's traditionally high level of skills as well as the research that is behind so much commercial innovation. A major high powered commission has proposed sweeping changes in the higher education system but there are as of now no indications as to whether the new government that was formed in March 2009 will adopt these proposals.

Another substantial challenge is that the OCS programmes, as mandated by law, cannot tackle is the tendency of entrepreneurs and venture capitalists to sell their R&D intensive companies to multi-national corporations at a relatively early stage. Medium and larger sized firms provide far higher spillover effects to the economy and are much more stable employers. Measures that could address this problem will have to deal with issues such as commercial and credit risk that are beyond the bounds of the law that governs the OCS. So far there are no concrete proposals on the table to address this challenge.

1. Main trends and challenges in the National Innovation System

1.1 Recent economic trends and market developments

With GDP growth of 4%, 2008 appears to have been a fairly good year for the Israeli economy (certainly if we compare this growth rate to that of other industrialised countries/areas in 2008: Euro area – 0.8%, US – 1.1%, Japan - -0.7%). However, the development of growth during 2008 shows clearly that the global economic crisis kicked in with a delay to the Israeli economy compared to other economies, but it certainly kicked in: growth in the second half of 2008 slowed to an annualised 0.8%, compared to 5.3 % in the first half of the year (similar to the average annual growth rate in 2004-2007). Quarterly data for 2008 show the effect of the global crisis even more clearly: in the 1st quarter – growth was an annualised 5.6%, in the 2nd quarter – 3.4%, in the 3rd quarter – 0.7%, while growth turned negative in the final quarter of 2008 (-1.6%). The negative GDP growth rate accelerated to -3.7% in the opening quarter of 2009.

Most major GDP components contributed to the slower growth in the 2nd half of 2008, with declines in this period: private consumption (by an annualised -1.2%), fixed asset investment (-5.7%). But the most severe decline was in exports of goods and services (-18.5%), a direct result of the global recession which reduced demand for Israeli exports: the decline in exports actually began in the 2nd quarter of 2008 (-11.7%). Imports of goods and services also dropped sharply in the 2nd half of 2008 (-15.2%): even though this development helped to restrain the effect of the global recession on Israeli domestic activity, the fall in imports is in itself a direct reflection of the global recession, given Israel's dependence on imports of raw materials and investment goods.

Exports were not helped by exchange rate developments during 2008. The Israeli shekel strengthened by 16% against the US$ from the end of 2007 through July 2008 (after strengthening throughout most of 2007 also) and by 17% against the Euro through October 2008, seriously reducing the competitiveness of Israeli exports.

The global financial crisis was well reflected in Israeli stock price developments during 2008: the central stock price index, Tel Aviv 25, slumped by 46.2% during the year. The drop in September-December 2008, parallel to the worsening of the crisis following the collapse of Bear Stearns and Lehmann Brothers, was 35%. Parallel to stock price developments in other countries, the Tel Aviv 25 index recovered by some 31% in January-June 2009: analysts worldwide are asking if this significant stock price rally is an early indicator of a recovery in the real global economy. At the height of the crisis there was great concern about heavily leveraged Israeli conglomerates, many of which were deeply exposed to real estate markets in various parts of the world. This concern retreated after several months. Some firms did default on bond covenants but most of the largest firms managed to cope by selling assets. A buoyant stock market since the beginning of 2009 has substantially reduced the level of risk.

The financial crisis has not led, up to the present, to any bank closures in Israel: Israeli banks had mostly minimum exposure to US mortgage-backed securities and other risky assets that caused havoc with banks in other countries, particularly the US. However, the credit crisis in Israel is probably as severe as it is elsewhere around the world.

Inflation surprisingly accelerated during 2008, with consumer prices increasing by 3.8%, compared to 3.5% during 2007 and a 0.1% decline in 2006. Much of this inflation (during 2007 as well) was "imported", the result of the steep increases in international oil and commodity prices. When these external effects wore off in the 2nd half of 2008, inflation turned negative, under the influence of the developing domestic recession. However, one major inflation puzzle is the ongoing increase in housing prices (up by 12.1% during 2008), at a time when these prices are falling steeply in other economies, an expected result of a recession period. The increase in Israeli housing prices continued during the 1st half of 2009, so the puzzle continues.

Unemployment conventionally reacts to a recession with a lag, and this was true of the Israeli economy during 2008. The unemployment rate continued declining during the 1st half of 2008 reaching 5.9% in the 2nd quarter and remained at this level in the 3rd quarter. Only in the final quarter of the year did it begin increasing - to 6.5% - and then jumped to 7.6% in the opening quarter of 2009 and then to 8.4% in May 2009. Other partial unemployment indicators point to an ongoing increase past the 1st quarter with analysts forecasting a continuing increase of unemployment through the end of 2009, even though an improvement in activity levels is considered likely by then.

One of the earliest indicators of the developing recession was the government's tax revenues: direct tax revenues (e.g from income tax) began declining as early as January 2008, while indirect tax revenues joined the decline from mid-year. The government's budget deficit had declined continuously throughout the rapid growth period of 2004-2007, and the budget balanced in 2007. The deficit went back up to 2.8% of GDP in 2008 – mainly as a result of the shortfall in tax revenues – and is expected to soar to some 6% of GDP in 2009 (similar to expectations regarding soaring deficits in other countries) as tax revenues continue to decline in the current year, reflecting the ongoing recession.

Following the general election of February 2009, a new coalition government took office in March without an approved budget for 2009. Because of the delay in approving the budget, the government decided to propose a 2-year budget – for 2009-2010 – in the hope that this would help stabilisegovernment activity and ensure the government's contribution to assisting the revival of the Israeli economy for a period of two years.

The new 2-year budget was finally approved in mid-July 2009, but arguments are still continuing regarding the ability of the new budget to assist the Israeli economy to recover from the recession. One of the main arguments concerns measures taken to offset the ongoing decline in tax revenues: one decision in this area is a 1% increase in VAT – to 16.5%, but many analysts argue that this is inappropriate if the government is interested in increasing private consumption, necessary to help the economy recover.

Exhibit 1: Comparable indicators of economic performance

Indicator	National performance		EU 27 average	
	2005	2008	2004	2008
GDP per capita in PPS (EU27=100)	NA	NA	100	100
Real GDP growth rate (% change previous year)	5.1	4.0	2.5	0.9
Labour productivity per person employed (EU27=100)	NA	NA	100	100
Total employment growth (quarterly % change) (1)	3.9	3.5	0.7	0.9
Inflation rate (average annual)	1.3	4.6	2.0	3.7
Unit labour costs (growth rate)	NA	NA	-1.4	0.6
Public balance (net borrowing/lending) as a % of GDP	-2.4	-2.2	-2.9	-2.3
General government debt as a % of GDP	94.2	78.0	62.2	61.5
Unemployment rate (as % of active population)	9.0	6.1	9.0	7.0
Foreign direct investment intensity	NA	NA	0.9	3.4 (2007)
Business investment as a percentage of GDP	17.4	18.9	17.2	18.7 (2007)

Source: Israel's Central Bureau of Statistics

Comparative data shows that Israel is not very strong in overall global competitiveness, ranking 34th in the 2009-2010 WEF global competitiveness ranking. However with the regard to entrepreneurship the story shifts with Israel ranking eighth in the GEM ranking of High-Expectation Entrepreneurship in the 2007 GEM ranking below.

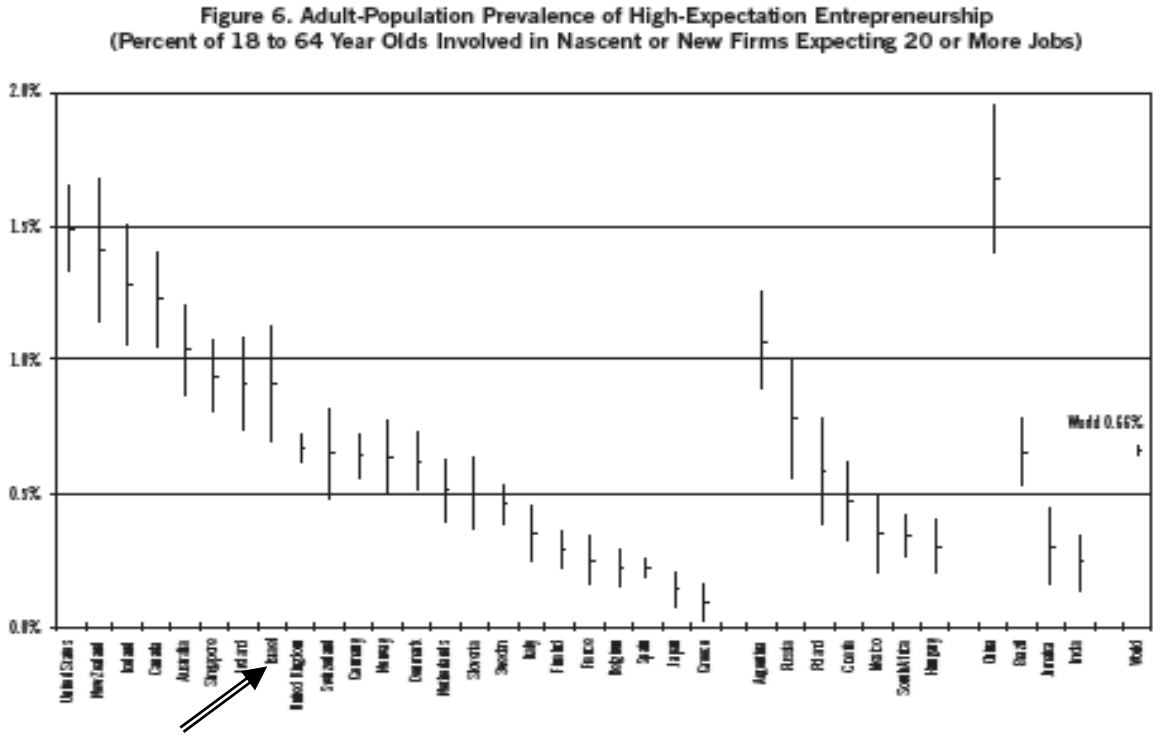


Figure 1: 2007 GEM ranking of high-expectation entrepreneurship

When the focus tightens to innovation-based entrepreneurship in medium to high technology entrepreneurship, the difference is even more radical with Israel ranking second worldwide after Japan, according to the 2007 GEM Israel report. The striking difference between the overall competitiveness ranking and the innovation based entrepreneurship ranking serves to illustrate the importance of technology start-ups top the Israeli economy.

1.1.1 The credit crisis and its effect on innovation activity

The high tech sector in Israel contributes a very significant share of overall economic activity (25% of industrial production, close to 50% of industrial exports, with the ICT sector alone contributing over 10% of total GDP). Israel learnt during the 2001-2003 recession, at the time of the global hightech crisis, just how severe the effect of a hightech crisis can be on the macro-economy, given the concentration of resources in the hightech sector.

The current recession is more general and less centred on the hightech sector. Nevertheless, there are signs that the hightech sector is being very hard-hit and is definitely contributing to the crisis, though not necessarily more so than other economic sectors. Industrial production increased by an impressive 7.4% in 2008, but as in the case of GDP, we see the effect of the recession in the 2nd half of the year when total production declined by 1.9% after increasing by 6.2% in the 1st half. Hightech industrial production followed a similar pattern of behaviour, with its growth slowing from 13.2% in the 1st half of 2008 to just 2.3% in the 2nd half.

Total industrial exports jumped by 18.6% in the whole of 2008, compared to 2007, but declined by 3.7% in the 2nd half of the year, compared to the previous half, after increasing by 14.1% in the 1st half of 2008 compared to the 1st half of 2007. Parallel developments of high tech industrial exports were a less-impressive 8.7% increase in the whole of 2008, with a 7.3% increase in the 1st half changing to a 2.8% decline in the 2nd half.

The ICT sector in Israel on its own traditionally contributes more than 10% of total GDP. In 2008, the GDP of this sector increased by a minimal 0.4% after soaring by an average 9% in the previous 4

years (2004-2007). The share of ICT in total GDP declined to 11.2% in 2008, its lowest level since 2004.

Data on the number of employees in the hightech sector show a continuing increase in 2008 as a whole, but surveys of demand for technology workers from M.I.T., a placement firm with a good record of tracking industry trends, show a decline of 34% in the demand for these workers in the period between November 2008 and March 2009. Significantly, the decline in demand is greatest for technology managers and team leaders, which indicates lower demand from new firms or new units within firms. Demand for managers has been declining for the past eight quarters while demand for team leaders has declined in four out of five quarters. Media reports about layoffs in high-tech indicate that the strongest hit are the smaller firms, but there is no empirical data yet to back up this impression.

There is no evidence that laid-off hightech personnel are transferring their innovation skills to new entrepreneurial directions. On the contrary, the government has been trying to assist these personnel by creating a programme for them to enter the school system as teachers, but the programme has still to be implemented by the Ministry of Education.

It was only to be expected that one aspect of the hightech crisis in the current recession would be a financing shortfall, and initial figures indicate that the shortfall looks nearly as serious as in the 2001-2003 hightech crisis. Venture capital (VC) investment in Israeli high tech companies continued to increase in 2008 as a whole, reaching its highest level since the peak year of 2000, at the height of the high tech boom. However, the final quarter of 2008 saw a sharp drop in this financing, which continued into the 2nd quarter of 2009. It is worth noting that the decline in foreign VC investment in these two quarters was steeper than in Israeli VC investment (average quarterly declines of 36% and 28%, respectively), but the share of foreign investment remains at 60% or more.

Q2 2009 figures show that Israeli firms raised €187m in this quarter, a 40% decline compared to the same quarter of 2008, but a 5% increase over the previous quarter. If the current rate persists, VC investments will reach somewhere around €700m compared to €1.1b in the previous year. However, VC investments in the first half of the year tend to be higher than in the second half, and by this yardstick, VC investments might fall by nearly 50% during the year. Since this is a year like no others before it, it is hard to forecast funding levels, not to speak of their economic effect.

A dataset compiled by Applied Economics for the Caesarea Conference in July 2009, based on data from the Central Bureau of Statistics, indicates that a 1% increase in VC investments in Israel leads to a 0.07% increase in business sector GDP compared to a 0.05% increase in business sector GDP for business investments that exclude venture capital. Similarly, a 1% increase in VC investments yields a 0.37% increase in high tech employment compared to a 0.31% percent in high tech employment for a 1% increase in general business investments excluding venture capital. The obverse -- regarding the effects of declines in VC investment -- is neither proven nor likely because of the effect of investments in place, but it does indicate the critical importance of venture capital for the local economy.

One major change in OCS funding in 2008 was a substantial increase in the amount of R&D grants to very small firms with annual sales of less than €180,000. Grants to these companies increased to 55% of the number of grants approved by the R&D Fund, the OCS' largest support framework. In terms of expenditure, these grants increased from €69m to €93m in 2008. We do not know if this increase was caused by more requests from smaller firms, as a result of the economic crisis, or by a decision by the OCS to extend more assistance to these firms because they are more vulnerable to the downturn.

The share of private sector investment in innovation in Israel is very high, some 80%, and the government has for a long time now tended to rely on the private sector to provide the finance for promoting innovation. One example of this is the growth period of 2004-2007: during these years, business sector financing of civilian R&D jumped by a very significant 44.8%, while the government increased its financing by only 17.9%. Even more dismal is the picture regarding expenditure on R&D by the Office of the Chief Scientist (OCS) in the Ministry of Industry, Trade and Labour – the OCS is the main player in formulating and implementing innovation policy in Israel: In 2004-2007, OCS expenditure on R&D actually declined by 35%.

In 2008, OCS expenditure increased to some 1.5 billion shekels (€285m) from a low of 1.17 billion shekels (€208m) in 2007, while the 2009-2010 budget calls for a level of expenditure in 2009 similar to that in 2008. It seems that the 2008 increase in OCS innovation expenditure was a definitive

government response to expectations regarding the negative influence of the global crisis on business sector innovation expenditure: the Chief Scientist made a statement to this effect, the Bank of Israel recommended increasing R&D expenditure in response to the crisis and – the most important bottom line – the OCS budget was almost the only major budget component that increased in 2008.

1.2 Recent trends in the national innovation performance

Israel was not ranked in EIS 2008 because the 2008 ranking was reserved for EU member states only. But Israel was ranked in the GIS, which provides somewhat less depth. In this ranking, Israel ranks fourth behind Sweden, Switzerland and Finland, with an increase in the parameters that trace firm activities and a decrease in human resources and infrastructures and absorptive capacities. Preliminary data obtained from the Israeli Central Bureau of Statistics shows a fairly stable picture that does not reflect the current economic crisis.

For EIS 2009, the number of indicators has been increased to 29 from the previous 25. Besides the new indicators in the list, there have been significant changes in the definitions of indicators and also an overall regrouping of the indicators into 3 groups: Enablers (group numbers 1.1 and 1.2) – divided into sub-groups of Human Resources, and Finance and Support; Firm Activities (group numbers 2.1, 2.2 and 2.3) – divided into Firm Investments, Linkages & Entrepreneurship and Throughputs ; Outputs (group numbers 3.1 and 3.2) – divided into Innovators and Economic Effects.

Of the new list of indicators, 8 are based on results from the Community Innovation Survey (CIS), which does not yet exist for Israel. Of the 21 remaining indicators, Israeli data are available for 15, which are listed in the following table:

Exhibit 2: Israeli indicators parallel to EIS

No. of indicator	Title of indicator	2006	2007*	2008*
1.1.1	S&E and SSH graduates per 1000 population aged 20-29	40.3	40.8	n/a
1.1.2	S&E and SSH doctoral graduates per 1000 population aged 25-34	1.0	1.1	n/a
1.1.3	Population with tertiary education per 1000 population aged 25-64	46	44	n/a
1.1.5	Youth education attainment level (% population with secondary educ.)	86	88.4	n/a
1.2.1	Public R&D expenditure (% of GDP)	0.82	0.80	0.81
1.2.4	Broadband access by firms (% of firms)	20.0	n/a	n/a
2.1.1	Business R&D expenditures (% of GDP)	3.46	3.74	3.81
2.3.1	EPO patents per million population	n/a	n/a	n/a
2.3.2	New community trademarks per million population	36.3	n/a	n/a
2.3.3	New community designs per million population	10.8	n/a	n/a
3.2.1	Employment in medium hi-tech and hi-tech manuf.(% of total workforce)	4.6	4.6	4.6
3.2.2	Employment in knowledge intensive services	5.9	5.9	5.9

	(% of total workforce)			
3.2.3	Medium and hi-tech exports (% of total exports)	22.5	n/a	n/a
3.2.4	Knowledge intensive services exports (% of total service exports)	59.62	n/a	n/a

*Preliminary estimates
Source: Israel Central Bureau of Statistics

The data on human resources (1.1.1 through 1.1.5) show a continuing gradual increase in recent years (through 2007) though the population with tertiary education (1.1.3) dropped slightly in 2007 to 44 per 100, compared to 46 in 2006. The data in these indicators clearly do not support the argumentation in this report regarding the third challenge, outlined in section 1.3. The authors claim, however, that the indicators do not yet reflect factors such as the decline in international school ranking systems such as PISA, decline in government budgets per student in tertiary education and declining research budgets.

Public R&D expenditure (1.2.1) has been receding – to 0.81% of GDP in 2008, compared to a peak of 0.97% in 2003. In contrast, business R&D expenditure (2.1.1) increased to 3.81% of GDP compared to 3.19% in 2003. The economic crisis is not reflected in 2.1.1 and the upward trend is likely to continue, with some bumps because of the current crisis. Thus, the emphasis on private sector expenditure on innovation in Israel continues.

The employment indicators (3.2.1 and 3.2.2) show that the share of employment in innovation areas remains stable in recent years (through 2008). Absolute data on the number of employees in the hi-tech sector show a continuing increase in 2008, both in manufacturing and services, a sign that the economic crisis did not effect total high tech employment in 2008, despite the numerous reports in the media about layoffs in this sector.

In the Israeli economy statistics regarding venture capital activity are a useful leading indicator. The changes in the level of VC investments tend to be much larger than the future economic activity they represent. After an exceptionally good year in 2008 when VC investment levels reached €1.12b, Q1 and Q2/2009 data from the Israeli data source IVC-Online show a decline of 50% compared to the first half of 2008. It is too early yet to see if a modest 5% increase in Q2/2009 investments compared to Q1 2009 signals faint signs of recovery. Most significantly, the average deal size in Q2 2009 declined to €1.61m. compared to €2.84m. in the same period of the previous year.

An international comparison by Ernst and Young regarding VC investments worldwide in Q1/ 2009 shows that the Israeli VC market reacted more sharply to the crisis than other areas. In Q1/2009, according to this analysis, VC investments in Israel declined by 75% compared to 35% in Europe, 55% in China and 48% in the US. The sharper decline can be attributed to two reasons: a) the first half of 2008 was an exceptionally good period for VC investments in Israel and b) the heavily ICT-centric nature of Israeli VC investments leads to higher volatility.

In terms of economic impact in an economy heavily influenced by start-up performance, the key element might be not the total level of investment but the size of the investment round. Smaller investment rounds can mean several things: firms will have to do more with less resources and less people, management will have to spend more time looking at the next investment round and firms will have less capacity to make an impact in their designated markets.

With all this, it must be stressed, however, that Israeli start-ups and VC investments have survived and prospered after worse declines. The current decline is based on global conditions and not - like in the previous slump of 2001-2003 - on inflated valuations, a factor that subsequently affects the ability of VC funds to raise more capital. Several VC firms say privately that they have excellent companies in their portfolio that are growing and are just waiting for market conditions to allow profitable exits.

1.3 Identified Challenges

Exhibit 3: Main innovation policy challenges

Description of challenge	Relevant indicators and trends
1. Decline in private sector funding for innovation, especially for start-ups, but also in more mature firms.	The relevant indicators are: 2.2, 3.1, 3.4, 4.1,4.2 and 4.5. There is no trend apparent yet in the data; it will probably be reflected next year
2. Lack of enough larger innovating firms. Data shows that these firms provide higher additionality than start-ups and SMEs and are better placed to withstand crises	The relevant indicators are: 2.2, 2.3, 4.1 and 4.2. There is no trend apparent yet in the data, yet the problems stemming from not having enough firms of this kind is supported by analyses of Israel's technology industries.
3. Long-term education programmes necessary for provision of required human capital	This challenge refers to EIS indicators 1.1, 1.2 and 1.5. It is a perennial challenge, and probably the most serious challenge of all.

The private sector's very high share in innovation finance makes the country's innovation system highly vulnerable to macro-economic slumps and especially to slumps in capital markets. The very high share of small innovating firms, especially start-ups, means that these firms are even more vulnerable because of their dependence on Venture Capital. There has always been a traditionally high level of correlation between VC investments and capital market levels. Typically, VC investments tend to decline in tandem with capital market developments but take far longer to recover. There is detailed publicly available information on the decline in VC investments, but not for innovation investments in mature firms. The best indicator illustrating the crisis is the sharp decline in demand for high tech workers.

Start-ups are an essential and important element in the Israeli economy. Many governments worldwide seek both the very high level of innovation in these small firms as well as their access to capital and access to global technology markets. However, success in this area has its prices. Only four of the most successful Israeli technology firms were founded after 1995; the most successful Israeli start-ups are usually sold to multinational corporations in a few years. One the one hand, this cycle of M&A feeds the VC funds and the start-up ecosystem. But a study by the OCS (expanded in section 3.3 of this report) suggests that larger technology firms make more efficient use of government assistance. Tellingly enough, few of the larger Israeli technology firms laid off R&D workers during the current recession.

The Israeli economy depends to a very large extent on the capacity of its companies to compete internationally in highly innovative areas. For this the country used a superlative education system and a vibrant research community. There is increasing evidence that the source of the skills needed by the innovation system is in deep crisis. Many of the reasons for this crisis are connected with the consistent underinvestment by the government in the education and research systems since the early to mid nineties of the previous century, when mass immigration from the former Soviet Union radically upgraded the country's skills inventory. This upgrade in skills coupled with the business sector's proven capacity to raise capital for innovation may have been behind the decline in funding for education and research. Total government funding per student in both colleges and universities has declined from €7,451 per student in 1996 to €6,725 in 2005, which illustrates at least part of the problem.

In a country without a formal innovation policy methodology, the definition of challenges is to a certain extent a matter of judgement based on data. An alternative, but similar view of challenges will be presented below in section 3.1 in the assessment of how well policy responds to challenges.

2. Public Support to Innovation

2.1 Main objectives for innovation policy

Exhibit 4: Main innovation policy documents

Name of document	Link
Establishment of Biotechnology Fund	http://www.moital.gov.il/NR/rdonlyres/3D729DD8-E097-41F1-B163-D5AFE55EC869/0/JDoIGovernmentBackedIsraeliBioTechnologyFund250609.pdf
Effects of Government Support for Industrial R&D on the Israeli Economy (Applied Economics)	http://www.moital.gov.il/NR/rdonlyres/42218509-67BD-492A-9332-33AC27436B41/0/gov_mop62008.pdf
Report of the Committee to Examine Means to Strengthen Peripheral Areas and Traditional Industries (Makov Report)	(http://www.moital.gov.il/NR/rdonlyres/1B769A32-9F6E-4356-AD18-D197651677B5/0/MakovFinalMerged.pdf
Programme to encourage multinational corporations to set up project centres focused on traditional industries and peripheral areas	http://www.moital.gov.il/NR/rdonlyres/7A5D8001-95D4-454F-8F32-3FBB7C4C3315/0/mercazpoject.PDF
OCS annual report for 2008, February 2009	http://www.moital.gov.il/NR/rdonlyres/DAD0974E-2ED2-4866-8143-D61C74665C65/0/sikum2008.PDF

In previous TrendChart reports, we have noted the lack of a coherent overall innovation policy in Israel and a very limited number of policy measures that have been implemented in recent years. This situation did not change radically in 2008 to the present. However, this latest period has been characterised by new thought processes in the innovation area, which have led to some new measures and could lead to more in the future. The processes certainly show that policy makers are beginning to understand the need for an overall innovation policy and that the long-run success of innovation in Israel cannot rely on the success that Israel has had in the past 15-20 years in the high tech area.

The new thought processes are well reflected in some of the policy documents presented in Exhibit 4: it is worth noting that all these documents are to be found on the website of the Ministry of Industry, Trade and Labour whose Office of the Chief Scientist (OCS) is the main government player in the creation and implementation of innovation policy in Israel (for more on the OCS, see Section 2.2 below).

The main new thought processes can be listed as follows:

1. There is a need to increase investment in Israeli high tech areas other than ICT, in particular bio-technology. Other areas considered worthy as investment targets – not only in Israel, but globally – are alternative energy and water technology.

2. There is a need to analyse the contribution to the macro-economy of investing in innovation, both in general and by size of firm. For years, economists and politicians in Israel have argued the importance of investment in innovation for macro-economic growth, but only recently have steps been taken to back up this argument with empirical results.

3. To determine the share of innovation investment in traditional industries in Israel compared to other countries, and to measure the benefit of such investment to the macro-economy. Israel is recognised as a major power in the global high tech sector, but a recent committee established that Israel ranks very low internationally in encouraging innovation in the more traditional areas of the economy.

Evidence of the understanding regarding the need to invest in non-ICT high tech is reflected in the Government plan to establish a special biotech fund in the amount of 250 million shekels – some 45-50 million Euro (see 1st item in Exhibit 4): the terms of the fund are due to be published by 15 September 2009. The policy document issued, a Joint Declaration of Intention by the OCS and the Ministry of Finance, states that "the Israeli government has identified the enormous potential of the local biotechnology market" and at the same time "acknowledges that this potential has to be realised".

The study by Applied Economics (www.applied.co.il: see 2nd item in Exhibit 4) is a major attempt to quantify the contribution of R&D investment on economic growth: commissioned by the OCS it concentrates only on industrial R&D and therefore provides incomplete coverage of the contribution of overall R&D investment on the macro-economy. However, it can be considered a policy document in so far as it provides guidelines for optimal investment in industrial R&D – both at the macro-industrial level and also by size of firm: the study (which is published in Hebrew only) specifically states one of its major aims as "providing to policy makers a quantitative estimate of the expected additional product resulting from government investment of an additional shekel in industrial R&D." (for more details of this study and its conclusions, see Section 3.3 below).

Items 3 and 4 in Exhibit 4 refer not only to the need for more innovation investment in the traditional sectors of the Israeli economy, but also in the peripheral geographic areas of the country, particularly in the Northern (Galilee) and Southern (Negev) regions of Israel. The need to develop the peripheral areas – in view of their lower socio-economic status compared to the central region – has been on the agenda for decades: committees set up and reports written have done little to rectify this situation.

The backward nature of the peripheral areas, from the point of view of economic growth, has now been linked with the backward nature of traditional economic sectors, creating calls for more innovation investment in both (there is also a commonality here, because the share of traditional sectors ends to be higher in the peripheral areas than in the more prosperous areas of Israel), as a means of improving their relative economic situation.

The Makov Committee report (item 3 in Exhibit 4: published in Hebrew only) states specifically that "encouraging direct competition in labour-intensive goods with countries whose labour costs are significantly lower than in Israel is not a long-term solution for the traditional sectors, and will not allow them to increase their employment and play a more central role in national production and exports": the Committee therefore does not recommend this policy approach. Instead, government support to enhance the traditional sectors' contribution to growth should be based on more innovation – developing new products, improving existing products and production methods, by encouraging technology-intensive competition. The report notes that in contrast to this recommended aim of policy, Government support to industrial R&D declined steadily in the decade of 1994-2004.

Item 4 in Exhibit 4 declares the aim of the proposed programme as "encouragement of multi-national industrial companies to implement R&D projects in cooperation with an Israeli partner, with emphasis on implementing R&D projects in the peripheral areas of Israel and in traditional sectors".

The Annual Report of the OCS for 2008 is not a policy document as such, but rather a summary of OCS activity in 2008. However, given the central role of the OCS in innovation policy making in Israel (more on this in Section 2.2 below), the summary provided by the report is an essential bird's eye view of current directions of implemented innovation policy. The 2008 report emphasises the effect of the credit crunch resulting from the global economic crisis on innovation activity, stating categorically that OCS activity in 2008 aimed at "encouraging and expanding investment in industrial R&D, despite the crisis" (see more on the effect of the crisis on innovation in Section 1.1.1 above).

A developing action-process (rather than thought process) in the area of innovation in Israel since 2008 is the establishment of information systems on innovation. Though not directly policy measures nor backed up by policy documents, these processes are essential for policy-making in the future, which depends on how much is known about innovation today. Two main projects are worthy of mention in this context: the first is a comprehensive innovation database being created by the National R&D Council (for details on the place of this Council in the innovation governance system, see Section 2.2 below).

The second project is implementation of a country-wide innovation survey by the Central Bureau of Statistics, as part of the requirements of Israel's candidacy for membership in the OECD, which is under consideration at present. Though this survey is not a result of domestic policy-making but rather an obligation placed on Israel by an international organisation, there is no doubt that it will provide valuable information regarding the degree of innovation in Israel at many different levels. The OECD survey could well serve as a relevant framework for providing information to a Community Innovation Survey (CIS), recommended by the European Commission in recent years as a source of information on innovation in Israel, needed for Israel's inclusion in the European Innovation Scoreboard (EIS) and for Trendchart reports, as an Associate Member State of the European Union.

2.2 Innovation governance system

2.2.1 Governmental bodies

There were no substantive changes in Israel's innovation governance structure in 2008 to the present. The Office of the Chief Scientist (OCS) in the Ministry of Industry, Trade and Labour (MITL) continues to be the main government body involved in the creation and implementation of innovation policy. The central role of the OCS (and thus of the Ministry of which it is a part) is determined, first of all, by the size of its budget compared to the budgets of other ministries involved in innovation: some 60-70% of total expenditure by government ministries on R&D has been spent by the MITL – via the OCS - in recent years.

In absolute terms, the MITL R&D budget retreated from a peak of 1.8 billion shekels in 2003 to 1.2 billion shekels in 2007. However, the budget increased to 1.5 billion shekels in 2008 (see Section 1.1.1 above), hinting that the OCS is the main government vehicle for coping with the economic crisis, via an increased budget to compensate for the reduction in business sector expenditure on innovation.

The centrality of the OCS in the innovation governance system is also determined by the multiplicity of innovation-promoting programmes controlled and/or operated by the OCS. The main programmes are the R&D Fund, Magnet, the incubators program, ISERD – the Israel Europe R&D Directorate for the EU Framework Programme and MATIMOP – the Israeli Industry Centre for R&D.

Some of these programmes are themselves collections of sub-programmes. Tnufa includes a programme to assist pre-seed start-ups, the new programme to promote innovation in traditional industry, the new programme to encourage cooperation between multi-nationals and Israeli industry (see Exhibit 4 above for mention of policy documents underlying these two last programmes), a programme for improvement of industrial design, and an additional new programme for assisting industry to adapt its products to global ecological standards. The new programmes listed under the heading of Tnufa are proof – albeit limited at the present time, from the point of view of available funds – of the intent of the governance system to adapt itself to new global standards and to assist in areas where innovation in Israel lags behind other countries

Magnet is also a collection of sub-programmes: Me'aged – assisting consortia from industry and academia to develop generic technologies that will benefit all consortia members, "Users Associations" – designed to spread the use of advanced generic technologies among all members of the associations, Magneton – for the transfer of technologies developed in academia to industry, Nofar – support to applied research at universities and Katamon – part of the government effort to advance water technology in Israel.

The incubators programme has proved efficient in assisting start-ups in their earliest stages and has chalked up considerable success in this area. The programme was started in the early 1990's, mostly to help absorb immigrants from the former Soviet Union with hightech ability who came to Israel in large numbers in the early 1990's. A major "administrative" change in this programme in recent years has been the privatisation of all the incubators, though it is too early to say to what extent the change will alter the effectiveness of the programme as a whole.

Most recently, the European Business and Innovation Network (EBN), the network of European incubators has expressed interest in Israeli incubators joining the network, and in early September 2009, a joint European-Israeli workshop is to be held in Israel to further this.

The main problem facing the OCS is its ability to provide adequate finance to new programmes considered important by the governance system, given the overall limited nature of its budget. Another "limitation" of the OCS is that it concentrates entirely on industrial innovation, and does not function in other economic sectors. Despite these limitations, and as we have reported in previous Trendchart reports, the OCS does more-than-satisfactory work in the area of promoting innovation in Israel.

The ministerial body that ostensibly has the widest mandate to determine innovation policy and promote innovation is the Ministry of Science. The ministry has been so-called only since the new government took office in March 2009. In the more distant past, the ministry was called the Ministry of Science and Technology, but subsequently, the areas of Culture and Sport were added to ministry functions. The recent separation between the science "function" and the culture and sport "functions" was implemented for political reasons – to create two separate ministries to meet coalition requirements. However, it is to be hoped that the new Minister of Science (a professor from the Technion, one of Israel's seven research universities, and without a political background) will be able to improve the lot of science in Israel, though it is still far too early to determine if this will be the outcome.

In the main, this Ministry, under its various names over time, has "enjoyed" extremely low budgets over the years and has never been considered important, from the political point of view, in Israeli coalition governments: if the OCS budget traditionally constitutes 60-70% of total government financing of R&D, this ministry's R&D budget constitutes less than 10%. There is no doubt that the promotion of innovation via the encouragement and financing of scientific research that the ministry can offer is limited.

There are two main entities that can be considered part of the overall innovation governance system that function under the official auspices of the currently-called Ministry of Science – the Forum of Chief Scientists and the National R&D Council.

The Forum of Chief Scientists, established by government decision in 1992, is ostensibly responsible for coordinating between R&D programmes in the various government ministries, and as such has a role in the innovation governance structure. However, its influence is largely determined by the influence of the Ministry of Science, which is limited. Obliged to produce an annual report on its activities, such reports have not in fact been produced annually, and the last one appeared for 2006.

Chief scientists of all the government ministries where this position exists (there are 10 of these ministries) are members of the Forum except for the Chief Scientist in MITL, who only has observer status. The reason for this is the power of this particular chief scientist in the governance system compared to that of his colleagues in other ministries, which could allow him to control the Forum. But the lack of membership of the Chief Scientist of the MITL in the Forum is in itself an indication of the weakness of the Forum.

The National R&D Council is a newer organisation than the Forum of Chief Scientists, established by law in 2002 and first convened in 2004. Its list of defined function seems to overlap that of the Forum of Chief Scientists – "to check existing governmental R&D programmes, to advise the government regarding failure of R&D programmes, to locate R&D needs and to make recommendations to the government regarding R&D policy".

The Council is fundamentally different from the Forum in that its members are not government officials but rather from different innovation sectors, including academia and the private high tech sector. This structure should add to the clout of the Council. However, during its short life span, it has already changed its Director once, and it is too early to determine the extent of its influence. Its "official" connection with the Ministry of Science, like that of the Forum, is a potentially weakening factor, and the Council is attempting to move its base to the Prime Minister's Office, without success up to the present. One important task currently being implemented by the Council is the creation of a comprehensive innovation database for Israel (see Section 2.1)..

2.2.2 Main bodies managing implementation of policies

We have already described the Office of the Chief Scientist (OCS) in the Ministry of Industry, Trade and Labour (MITL) not only as the main government player in the innovation governance structure from the point of view of creation of innovation policy but also the main governmental implementer of this policy (see Section 2.2.1): implementation is carried out via a series of OCS programmes with specific policy targets. Furthermore, the OCS is behind most of the new policy initiatives of 2008 to the present (see Section 2.1). But as also emphasised, the limitation of the OCS is that its policy creation and implementation roles are restricted to industrial innovation rather to innovation in general.

With regard to academic R&D, the main funding role is that of the Planning & Budgeting Committee within the Council for Higher Education (the Committee is best known in Israel by its Hebrew acronym – VATAT). The role of the VATAT has been described in detail in the 2009 ERAWatch Policy Mix report for Israel.

The VATAT is principally a funding channel and its link to policy implementation is via provision of funding to academic R&D, when changes in the volume of this funding are decided upon by the government. The best recent example of such a change was the decision of the Shohat Committee for Higher Education that delivered its report and recommendations to the government at the end of 2007, to increase funding of academic R&D to the extent of 800 million shekels. This recommendation has yet to be implemented.

The main problem with funding academic R&D is that it is generally not considered separately from funding universities in general, as part of the government's overall policy for higher education. If the financial situation of Israel's universities is difficult, it is mostly because student fees do not cover current costs adequately. Thus, policy-making in this area generally covers the need for more university funding as a whole, rather than the need for more specific funding for academic R&D: the VATAT has no real role to play here. There was criticism of the Shohat Committee that it missed the opportunity to delve deeply into the problems facing academic R&D and simply satisfied itself by recommending an overall funding increase to assist academic R&D.

2.3 Public funding to innovation

2.3.1 Review of the current range of support measures for innovation

Any comparison between the measures that govern the Israeli innovation system and those of the EU average show that the Israeli system accomplishes a great deal with relatively few measures, and that these measures are so constructed as to allow the OCS a great deal of flexibility both in policy making and in responses to both immediate and longer term challenges.

The main focus of measures and budget are to help firms innovate. This is the mandate designated by the law that governs the OCS. Issues of governance, human resources and innovation culture are of little interest to the Israeli policy maker in the field of innovation. The Council for Higher Education's VATAT unit is responsible for research and education, and even though this body shares the cost of Israeli participation in FP7, there is little joint policy making between the two bodies. Measures

regarding markets and innovation culture are simply not needed in a broader culture, in which many an ambitious Israeli mother wants her son or daughter to work in a start-up.

Governance is another issue that does not attract the attention of the Israeli policy maker. There have been no changes in structure, and the OCS has a robust and highly effective internal system of governance with a well proven system to select companies worthy of support and strong fiduciary controls over the outcome of this support. Possibly the fact that about one third of the OCS budget is derived from royalties from successful R&D projects is an internal guarantor of the effectiveness of the structure.

One area in which there has been some change is in research on innovation policies. There have been no measures related to this change, but the OCS has commissioned major studies and reports on both traditional industries and the effectiveness of public support to industrial R&D. In a very welcome act of transparency, these reports have been widely published, are available on the web and served a major part in public debate on innovation policy.

There have been no major changes in Israeli involvement in European projects. It is important to stress here that involvement in FP7, managed by ISERD, an OCS agency, has become increasingly important for research universities and Israeli firms. Israeli governments have slashed research budgets for government sponsored research by as much as 50% over the past eight years, meaning effectively that the government has only a tiny role in setting non-defence research agendas. The only area in which the government funds thematic research is through Israeli involvement in FP7 and some other European programmes.

The policy measure factsheet, cannot unfortunately serve as a useful term of reference for this discussion, since it ascribes a total budget of €2m, all of which is said to be spent on support to innovative start-ups including gazelles. In actual fact about 65% of the 2008 budget of about €272m went to the R&D Fund, which supports firms of all sizes, with the most of the remainder split between the incubator programme which helps only start-ups, and MAGNET, which usually works with more established firms. An analysis of the fact sheet should weigh the difference between the numbers of measures and their budgetary weighting. The paucity of Israeli measures might, however, make such an analysis less useful than in other countries.

Government support for industrial R&D changed in two major aspects during the period covered by this report. The first is in an increase in the OCS fund, specifically to the R&D Fund. As an emergency measure in the last quarter of 2008 to support R&D during the economic crisis, the Finance Ministry decided to increase the R&D fund's budget from about €123m to €169 in 2008. The budget for 2009 is at similar levels, reflecting government acknowledgement that in times of crisis it must step in to help the private sector, which finances the lion's share of Israeli R&D. There is a great deal of debate as to whether the sum allocated is sufficient, which will be covered in section 3 of this report, but what was clear was that the response was rapid and the sums allocated for 2008 were disbursed immediately.

The second and most radical change was in IL 34, the government's decision to join a biotechnology VC fund as a limited partner. The government virtually launched the Israeli VC industry in 1991 when it launched two competing programs Yozma and Inbal. The first concentrated mainly in investing in small VC funds, with some individual investments in small firms, while the latter tried to achieve the same aim through investments in publicly traded VC operations. Yozma was widely successful and was successfully privatised. Since then the government has seen no need to intervene in a successful industry.

Biotechnology, however, has been a tough knot, not only in Israel, but especially disturbing for Israeli policymakers who foresee that the local technology industry needs to diversify beyond its heavily ICT-centric profile. Years of consistent support both on the incubator level and through the R&D Fund did not yield the expected results. A study conducted by the Milken Institute in California (Accelerating Medical Solutions in Israel: Building a Global Life Science Industry) concluded that most life science investments have moved from pharmaceutical biotechnology to the more successful field of medical devices and that b) Israeli firms pharmaceutical biotech firms often fail in what is called the first death valley between preclinical trials and Phase I clinical trials.

The study was one of many elements that provided the biotech problem with sufficient political traction to eventually promote policy measures in this area, particularly establishment of the biotech fund. The best evidence of the commitment it gained is that: a) the fund was initiated jointly by the OCS and the Finance Ministry and b) the government is willing to try an untested concept of limited partnership in a VC fund.

The potential for success is clearly there: the Milken study states: " Israel is first worldwide in medical device patents per capita, fourth worldwide in biopharma patents per capita, seventh in the absolute number of medical device patents, and first worldwide in the share of life science patents in total patents." Financing is problematic, however. Over 20 Israeli life science companies have gone public on the Tel Aviv Stock Exchange over the past few years in an attempt to surmount the financing issues. The public issuances did provide some capital for continued R&D, but subsequent valuations show it is doubtful that public investors have the stomach for long pipeline and specialised risk of such companies. Venture capital for its part has steered away from pharmaceutical biotech. In 2007, for example 86% of VC life science investments were in medical devices, a far safer field with fewer regulatory hurdles and a shorter development span.

Another major issue is relationships with global pharmaceutical players. About 40% of the funds raised by biotech companies are raised from VC funds associated with global biotech players. In ICT, Israel has hugely enjoyed the leverage of hosting major research centres for companies like Intel and IBM, but has not managed to attract the equivalent global pharma companies to make use of its resources.

But the bottom line is risk. Neither Israeli VCs as they are currently constituted nor public markets have the appetite for the peculiar risk profile of biotech, with very long development times and a market dominated by the huge global pharma corporations. The new measure – the biotech fund - is intended to address this issue by offering investors a guarantee of a certain level of their investment and participation in the government's share of the profits. In Yozma, the level of guarantees was 80% -- a very high level. It will be interesting to see what level of guarantees the government will offer in the new fund. This will doubtless be settled in its negotiations with the general partner who will manage the fund.

2.3.2 New or modified support measures

Exhibit 5: New Innovation Policy Support Measures (since the last report)

IPM N°	Title	Innovation policy framework category	Organisation responsible
Il_34	Joint Declaration of Intention Government backed Israeli Biotechnology Fund	4.3.2 Support to risk capital	OCS/Finance Ministry
Il_13	R&D Fund (increase in budget)	2.3.1 Direct support of business R&D (grants and loans)	OCS

IL_34 is intended to offering government assistance in reducing the risk of investments in biotech companies. The increase in the budget for Il_13 is intended to ameliorate the effects of the global economic crisis. The IL_13 measure is the mainstay of Israel innovation policy. It has not been formally changed for a long time even though it has evolved informally to provide solutions for new challenges.

2.3.3 Strengths and weaknesses in the innovation policy support system

The strengths of the Israeli innovation system are best measured by its effects as demonstrated in the research cited in section 3.3. It is hard, however, to analyse the strengths and weakness of measures per se because the system, though active and responsive to challenges, operates with far fewer measures than is the rule in most European countries. With this caveat, the main strength of the system is in its flexibility and ability to integrate policies – such as the push to encourage innovation in traditional industries – throughout the system, in grants given by the R&D Fund, the Incubator system and the Magnet framework for pre-competitive research.

It could be argued that the main weakness derives from its governing legislation, the Law for the Encouragement of Industrial R&D which mandates – and limits – the kind of tools the OCS has used, with a huge degree of success, for the past 25 years. The OCS is only allowed to support industrial R&D. Issues such as skills, non-industrial innovation and others are not within its purview.

The positive side of these limitations is the single minded focus that enabled the OCS to play such a key role in transforming the Israeli economy. The negative side is this success in itself, which may have been one of the reasons that Israeli governments never debated or enacted a national innovation policy that would integrate educational issues, industrial R&D and government sponsored thematic research.

It should be noted that the radical shift in policy exemplified in IL 34 with the government decision to enter into the venture capital industry was mounted jointly by the OCS and the Finance Ministry because the existing tools of R&D support did not yield the required results.

3. Innovation policy and competitiveness: an appraisal

3.1 The ability of policy to address challenges

National innovation policies set priorities based on perceived challenges while often are motivated by international agreements and commitments, i.e. the Lisbon agenda. Therefore national policies act and react in a complex set of overall policy priorities and commitments. In this section, building on the analysis in the previous chapters, we are investigating how well national innovation policies identify and respond to systemic challenges, which may or may not be common in other EU Member States or even other countries outside EU.

3.1.1 How well does policy respond to innovation challenges?

Israeli industrial innovation policy is highly effective yet works without stated numerate goals. Without a formal definition of challenges, prioritisation, planning and allocation of suitable resources, the system responds only to those challenges that it can handle with its existing tool set. With this limitation in mind, it can be said that the system responds effectively to challenges and has demonstrated a great deal of flexibility over the years. What follows is a) a description of challenges and responses made by the system during the past two years and b) a broader description of challenges based on a presentation of a study by a very high-powered committee of experts to the Caesarea Conference in July this year.

1. The global economic crisis – The response was quick and effective, as the R&D Funds annual budget for 2008 was raised by 30% in Q4 2008 and by a similar amount for 2009. The question whether this increase was sufficient will be tackled below.

2. Market Failure of Biotech – This issue has been under discussion for many years. It could not be handled by the existing OCS tool set and a new mechanism had to be created. A new tool, government participation in a VC fund as a limited partner, was created, but it is significant that this step took a fairly long time to devise even though the challenge was openly acknowledged.

3. Low Innovation in Traditional Industries is an example of a challenge that could be handled with the exiting tools and has been promoted extensively for the past two years. It is too early to asses the effectiveness because so many of these firms had to cope with the effects of the global crisis this year.

A much broader description of challenges was bought to the annual Caesarea Conference, the top economic policy event of the year which is organised by the Israel Democracy Institute. The panel that drew up the presentation included senior government officials from the OCS and the Finance Ministry, experienced venture capitalists, the director general of VATAT, which is responsible for funding universities, the National Council for R&D, academic economists, business leaders and managers of major economic consultancies. The group was significant because it allowed for a high powered review of the entire innovation system: Its description of challenges is as follows:

- the current financing crisis
- continuing crisis in tertiary education and university research
- lack of enough medium to large technology based companies
- limited advances into new industries

- finance focussed too much only on early stages of firm development
- major reliance on foreign capital
- decline in resources to existing policy tools with no new policy tools being devised

The panel analysed the factors that enabled the Israeli economy to make its huge advances during the 1990s: A highly skilled population, a thriving academic research community; a strong cultural inclination towards technology, successful government innovation support policy, a strong entrepreneurial ethos, a strong defence R&D community, access to foreign capital, and a booming international ICT market. The panel found that these factors are no longer in play to the extent that made them such powerful contributors to economic growth during the '90s and have been superseded to a greater or lesser extent by the challenges outlined above.

These finding are backed up by data from other sources. The Ernst and Young global venture capital survey cited above reviewed VC investments in 2008. The US led the field with $28.8b. invested in 2008, followed by Europe with $6.2b., China, the major new player, with $4.2b. and Israel with $1.9b. (the discrepancy between this figure and the figure cited above for Israel from IVC-Online is due to different systems of counting: this method of counting is used here for comparative purposes). It could be said that Israel, for such a tiny country is holding its own with an investment level nearly one-third of Europe's. But in reviewing investments in cleantech, one of the new horizons for high growth companies, there is an entirely different picture. Here again the US leads with investments of $4.7b, followed by Europe with $889m, China with $462m and Israel with only $69m. The relationship between Israeli investments in this new industry compared to the rest of the world makes Israel an insignificant player. The heavy reliance on ICT based innovation cited in previous TrendChart reports seems to be becoming a problem.

Further data from the Israeli Central Bureau of Statistics show that among Israeli technology companies, Israel has only 36 firms with annual sales of over $100m and of these, 12 were founded after 1992 and only four after 1995.

It is significant that the current policy mix can respond effectively only to the first challenge. But here too the panel differed on the degree of the response required. Instead of increasing the OCS budget by €45m, the panel said, it should be increased by about €500m.

Regarding the challenge in education, the panel recommended immediate adoption of the recommendations of the Shohat Report, a report generated by a high powered commission to investigate tertiary education. This commission recommended a major increase in the budgets allocated to higher education, an upgrade of research infrastructure, moving over to more competitive financing as opposed to block financing of research, more money for research, and more frameworks for thematic research. The committee's recommendations were deliberated by the former government without any final decision. The current government has not yet indicated its position on the issue.

The other challenges involve extensive re-thinking of innovation policy. Israeli entrepreneurs and venture capitalists tend to sell their firms to global corporations at a very early stage because there is a good market for M&A and it makes most sense to sell early in terms of simple business priorities like time and risk. To change that equation and persuade the players that it is worth their time to grow the companies until they can go public would involve a whole raft of policies, some of which would have to reduce the risk of holding onto VC investments, and some of which would increase the profitability and prospects of larger technology based firms. Implementing these recommendations would necessitate looking at a broad range of measures that would affect the cost of capital and commercial risk.

The existing range of innovation measures, as defined by law and amended by administrative directives, has demonstrated a considerable degree of flexibility and a high level of responsiveness to challenges. However, it is becoming increasingly clear that the parameters of the existing system cannot encompass the scope of the challenges.

3.2 Effectiveness of policy design

Israel's innovation policy is basically an industrial innovation policy which is run by one agency, the OCS. The programmes run by the OCS are well managed and highly integrated. Projects such as the nano-technology institutive, the preference for biotech and the plan to increase innovation in traditional industries were implemented within the framework of the three major OCS programmes, the Incubator system, The Magnet project for generic R&D and the grants given by the R&D Fund.

The only major budget item that does not belong to these three programs is Israeli participation in FP7 which is funded jointly with VATAT with a small share from the Ministry of Science and Technology. This too, however, is run by ISERD, an OCS agency. The issue of integration is not relevant for this budget item, since the FP7 priorities are European.

With one exception, the independent US-Israeli BIRD-F programme, Israel's large network of international R&D agreements with countries, regions and multinational corporations are run by MATIMOP, another OCS agency that coordinates and runs these agreements as well as the EEN. Here too, the level of integration is high, and actual spending on funded bilateral agreements goes through the OCS Research Committee which approves all OCS grants.

3.2.1 Process of delivery

Overall, the delivery process of OCS measures is effective, with considerably less paperwork and a faster decision process than many European counterparts. This is largely due to the merits of the rigorous pre-funding evaluation system which involves on-site visits by evaluators. Here again, the integration of the system makes for efficiency with one body, the Research Committee, making all major decisions.

It is significant that the serious and well considered criticism of the Israeli innovation system cited in section 3.1 did not recommend any major changes in OCS methodology and delivery systems. The members of the panel who have intimate knowledge of the inner workings of the OCS had criticism of nearly every aspect of government policy but did not see fit to recommend changes in a system that works well.

3.3 Impact of public support for innovation

The OCS recently commissioned an in depth study to measure the impact of government support for innovation in industry. The study, conducted by Applied Economics, a research firm, constitutes in-depth research, based on data sets, concerning government support to industrial R&D between 1997 and 2003. In terms of indicators, there is no doubt that the concentrated effort over the years yielded the positive results that can be seen in the following EIS indicators: 2.1.1, Business R&D expenditure (% of GDP); 3.2.1, Employment in medium-hi-tech & hi-tech manufac. (% of tot. workforce); and 3.2.3, Medium and hi-tech exports (% of total exports)

The research was focussed on two separate questions:

- The degree of additonality that ensued from government support for industrial R&D – or in simple terms, whether government support for R&D crowded out private investment and if it did not, how much extra money did industry invest in R&D as a direct result of government support.
- Spillover effects of government support – as measured through the use of two econometric models to assess the overall economic effects of this support.

The results were unequivocal. The research found that among all industrial firms, government support for innovation at a level of NIS1m caused firms to invest an additional NIS1.28m – meaning that NIS2.28m in additional R&D resources were created. In software and R&D firms, the effect was even

more striking: government support of NIS1 m. encouraged firms to invest an additional NIS1.81m., thus creating NIS2.81m. of R&D resources that would not have been available without government support.

In measuring spillover effects, the study found that the effects were negligible among small firms with annual sales of less than €9m. Among firms with annual sales of between €9m and €54m, the spillover effects were at a minimum of between five and six times the amount of government support for R&D. Among firms with annual sales of over €54m, the minimum spillover effect was between 1.5 and 2 times government support.

The research also categorised firms according to the amount of government aid for R&D they had received over the years. Among a group of hightech firms that had received most government aid over the years, spillover effects were measured at a rate of 4.7 in terms of economic yield.

Comparing the results with research on additonality in several different countries, the researchers found that the rate of additonality in Israel was significantly higher than elsewhere, which seems to indicate that the Israeli innovation programmes have a systematic advantage. They caution, however, that methodological issues make this comparison less than entirely clear cut.

In terms of a rigid assessment of OCS performance, the most significant finding was that the firms the OCS had consistently supported over the years had a spillover effect of 4.7, which means that the taxpayer and the economy got an exceptionally good bargain.

3.3.1 Conclusions: possible future actions and opportunities for innovation policy

The research cited in section 3.3 demonstrates conclusively that the OCS is doing a good job and has done so consistently over the years. The concerns raised in section 3.1.1, the challenges in the beginning of this review as well as the challenges chosen in previous Trendchart reports show that the scope of the OCS mandate, however flexibly adopted, is not broad enough to encompass the real challenges that threaten a highly successful national innovation system.

What is needed goes far beyond tweaking the parameters of the existing system. The government's plunge into private equity involvement in biotechnology is encouraging in this respect, because it demonstrates a willingness to try entirely new tools. This however deals with one sector and involves a level of expenditure that will not be onerous because it is spread over several years.

Coping with the problems of research and the higher education system will be very expensive and involves debate at a national level. Similarly, creating a toolbox of incentives that will persuade entrepreneurs and venture capitalists to grow firms rather than sell them early will involve debate in which a broad variety of societal factors will have to be brought into play.

The toolbox needed to confront the challenges to higher education and research has been devised by the Shohat Committee. However much these findings have been criticised in Israel's highly argumentative and fractious culture of public debate, there is growing consensus that implementing these recommendations is indeed the right way to proceed. This consensus is in the meantime shared by a group that could best be called the elder statespeople of Israeli high tech, a group of business leaders, senior academics and present and past senior civil servants. The question is whether this small but highly influential group will manage to move the body politic to affect long ranging, expensive but highly essential changes to policy.

Regarding the challenge of company size, there is no toolbox of policy recommendations, but the research cited above shows that there is a clear economic advantage in going beyond the existing raft of innovation policy tools to allow more innovative firms to grow rather than be sold out.

Annexes

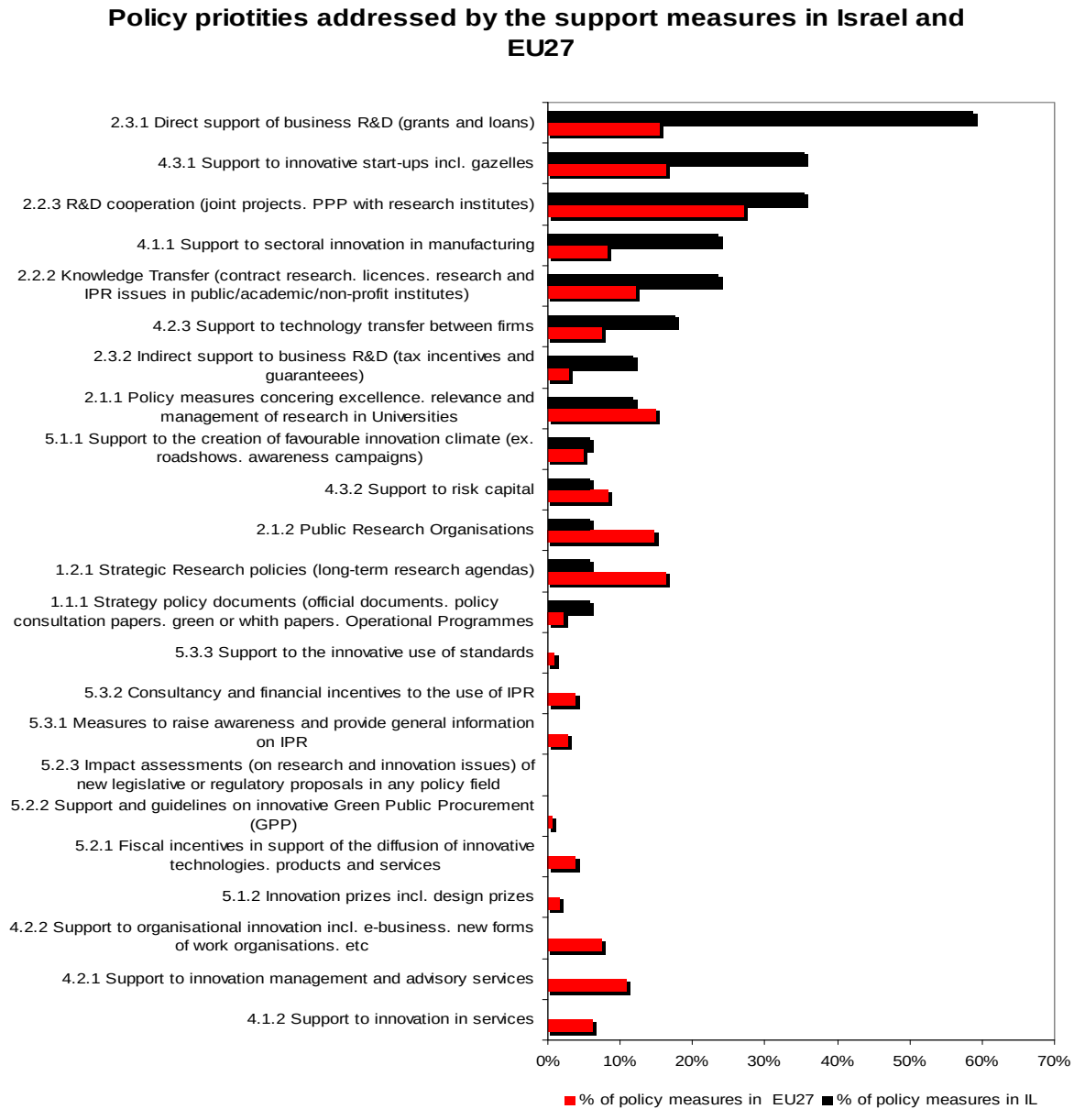
Annex 1: Country pages – Innovation Policy Support factsheet

1. Main policy priorities addressed by the support measures

	% of policy measures in EU27	% of policy measures in IL
1.1.2 Activities of official advisory and consultative forum	1%	0%
1.1.3 Policy Advisory services (technology foresight. scoreboard type activities. cluster mapping. sectoral studies of innovation)	2%	0%
1.2.2 Innovation strategies	4%	0%
1.3.1 Cluster framework policies	7%	0%
1.3.2 Horizontal measures in support of financing	6%	0%
1.3.3 Other horizontal policies (ex. society-driven innovation)	3%	0%
2.1.3 Research and Technology Organisation (private non-profit)	6%	0%
2.1.4 Research Infrastructures	8%	0%
2.2.1 Support infrastructure (transfer offices. training of support staff)	4%	0%
3.1.1 Awareness creation and science education	4%	0%
3.1.2 Relation between teaching and research	3%	0%
3.1.3 Stimulation of PhDs	7%	0%
3.2.1 Recruitment of researchers (e.g. fiscal incentives)	7%	0%
3.2.2 Career development (e.g. long-term contracts for university researchers)	6%	0%
3.2.3 Mobility of researchers (e.g. brain-gain. transferability of rights)	9%	0%
3.3.1 Job training (LLL) of researchers and other personnel involved in innovation	4%	0%
3.3.2 Recruitment of skilled personnel in enterprises	4%	0%
4.1.2 Support to innovation in services	6%	0%
4.2.1 Support to innovation management and advisory services	11%	0%
4.2.2 Support to organisational innovation incl. e-business. new forms of work organisations. Etc	7%	0%
5.1.2 Innovation prizes incl. design prizes	2%	0%
5.2.1 Fiscal incentives in support of the diffusion of innovative technologies. products and services	4%	0%
5.2.2 Support and guidelines on innovative Green Public Procurement (GPP)	1%	0%
5.2.3 Impact assessments (on research and innovation issues) of new legislative or regulatory proposals in any policy field	0%	0%

5.3.1 Measures to raise awareness and provide general information on IPR	3%	0%
5.3.2 Consultancy and financial incentives to the use of IPR	4%	0%
5.3.3 Support to the innovative use of standards	1%	0%
1.1.1 Strategy policy documents (official documents. policy consultation papers. green or white papers. Operational Programmes of Structural Funds)	2%	6%
1.2.1 Strategic Research policies (long-term research agendas)	16%	6%
2.1.2 Public Research Organisations	15%	6%
4.3.2 Support to risk capital	8%	6%
5.1.1 Support to the creation of favourable innovation climate (ex. Roadshows. awareness campaigns)	5%	6%
2.1.1 Policy measures concerning excellence. relevance and management of research in Universities	15%	12%
2.3.2 Indirect support to business R&D (tax incentives and guarantees)	3%	12%
4.2.3 Support to technology transfer between firms	7%	18%
2.2.2 Knowledge Transfer (contract research. Licences. research and IPR issues in public/academic/non-profit institutes)	12%	24%
4.1.1 Support to sectoral innovation in manufacturing	8%	24%
2.2.3 R&D cooperation (joint projects. PPP with research institutes)	27%	35%
4.3.1 Support to innovative start-ups incl. gazelles	16%	35%
2.3.1 Direct support of business R&D (grants and loans)	15%	59%

Figure 1.


Policy priotities addressed by the support measures in Israel and EU27
2.3.1 Direct support of business R&D (grants and loans)
4.3.1 Support to innovative start-ups incl. gazelles
2.2.3 R&D cooperation (joint projects. PPP with research institutes)
4.1.1 Support to sectoral innovation in manufacturing
2.2.2 Knowledge Transfer (contract research. licences. research and IPR issues in public/academic/non-profit institutes)
4.2.3 Support to technology transfer between firms
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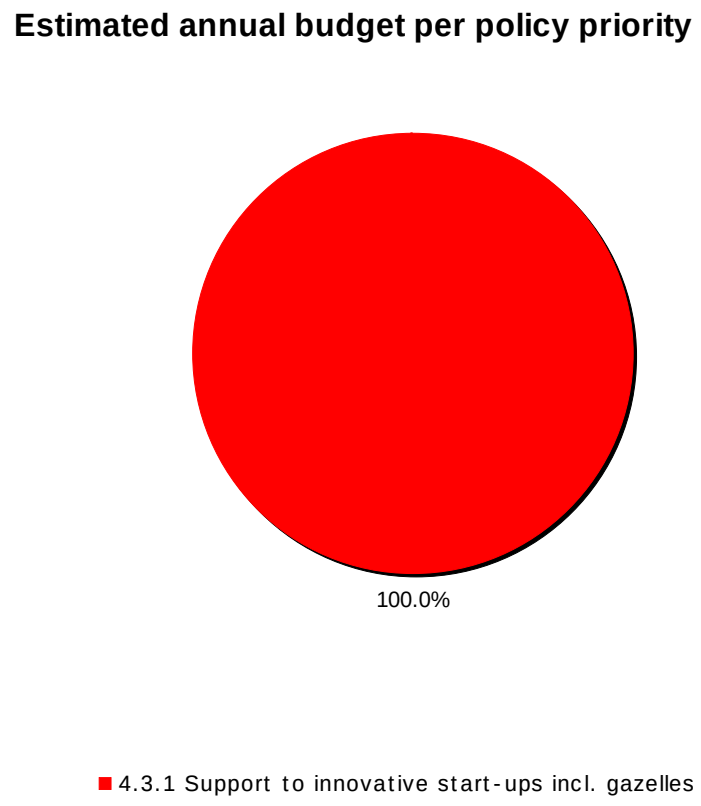
5.2.2 Support and guidelines on innovative Green Public Procurement (GPP)
5.2.1 Fiscal incentives in support of the diffusion of innovative technologies. products and services
5.1.2 Innovation prizes incl. design prizes
4.2.2 Support to organisational innovation incl. e-business. new forms of work organisations. etc
4.2.1 Support to innovation management and advisory services
4.1.2 Support to innovation in services
0%
10%
20%
30%
40%
50%
60%
70%
% of policy measures in EU27
% of policy measures in IL

2. Main policy priorities and their estimated budget (CHART)

	Estimated annual budget per category (€)	% of the total estimated annual budget
4.3.1 Support to innovative start-ups incl. gazelles	2,000,000	100.0%
Total	**2,000,000**	

Figure 2.



PROFILE OF PUBLIC INTERVENTION IN INNOVATION

3. Targeted research and technology fields

	% of total number of measures IL	% of total number of measures EU27	Frequencies IL	EU27 Frequencies
ICT	0%	7%	0	66
Biotechnology	0%	6%	0	55
Materials	0%	3%	0	26
Socio-economic sciences and humanities	0%	2%	0	21
Health	0%	5%	0	43
Food, agriculture and fisheries	0%	0%	0	0
Energy	0%	3%	0	31
Industrial production	0%	2%	0	15
Services	0%	1%	0	8
Transport	0%	1%	0	11
Environment (including climate change)	0%	5%	0	45
Space	0%	1%	0	10
Security and defence	0%	1%	0	5
Government and social relations	0%	1%	0	5
Other	0%	4%	0	34
Nanosciences and nanotechnologies	6%	3%	1	29
Total number of measures			17	952

4. Target groups of support measures

	% of total number of measures IL	% of total number of measures EU27	Frequencies IL	EU27 Frequencies
Consultancies and other private service providers (non-profit)	0%	11%	0	103
Other public education institutions (secondary,etc...)	0%	0%	0	1
Private institutions for education / lifelong learning	0%	4%	0	36
Business organisations (Chambers of Commerce...)	0%	9%	0	90
Trade Unions	0%	9%	0	83
Higher education institutions (education function)	6%	16%	1	149
Technology and innovation centres (non-profit)	6%	21%	1	202
SMEs only	18%	22%	3	209
Other	18%	17%	3	159
Scientists / researchers (as individuals)	24%	27%	4	261
Other non-profit research organisations (not HEI)	29%	33%	5	310
Higher educations institutions research units/centres	47%	46%	8	435
All companies	65%	40%	11	378
Total number of measures			17	952

5. Aspects of innovation process targeted by measures

	% of total number of measures IL	% of total number of measures EU27	Frequencies IL	EU27 Frequencies
Promotion of entrepreneurship/start up (including incubators)	6%	13%	1	121
Diffusion of technologies in enterprises	6%	22%	1	206
Improving the legal and regulatory environment	6%	7%	1	70
Innovation management tools (incl quality)	12%	16%	2	155
Awareness raising amongst firms on innovation	18%	17%	3	158
Pre-competitive research	18%	11%	3	101
Co-operation promotion and clustering	18%	11%	3	104
Industrial design	41%	15%	7	142
Applied industrial research	53%	21%	9	201
Development/prototype creation	59%	24%	10	229
Commercialisation of innovation (including IPR)	59%	20%	10	195
Total number of measures			17	952

6. Sources of co-financing of support measures

	% of total number of measures IL	% of total number of measures EU27	Frequencies IL	EU27 Frequencies
Co-financed by the Structural funds (ERDF, ESF,etc.)	0%	28%	0	269
Co-financed by foundations or charities	6%	4%	1	36
Other co-financing	24%	18%	4	169
Co-financed by the private sector	88%	33%	15	313
Total number of measures			17	952

7. Forms of funding of support measures

	% of total number of measures IL	% of total number of measures EU27	Frequencies IL	EU27 Frequencies
Venture capital (including subordinated loans)	0%	5%	0	49
Guarantees	0%	3%	0	33
No direct funding provided	0%	7%	0	68
Subsidized loans (including interest allowances)	12%	8%	2	76
Tax incentives (including reduction of social charges)	12%	6%	2	57
Other	29%	7%	5	65
Grants	88%	72%	15	690
Total number of measures			17	952

Bibliography

The publicly available sources for this report are cited in the documents section