Innovation policy in six candidate countries: The challenges
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Innovation Policy Profile: Cyprus

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1.1 Issues for innovation policy arising from the process of economic reform and accession

The Cypriot economy has evolved from an exporter of minerals and agricultural products in the 1960s, to an exporter of manufactured consumer products (e.g. clothing and footwear) in the second half of the 1970s. In the 1980s and 1990s, it developed into an international tourism and service centre. For the last two decades, there has been a tremendous growth of the tertiary sector at the expense of agriculture and manufacturing. This is a reflection of the comparative advantage of the country which stems from its stable macro-economic environment, the relatively high level of education of the population[1], the relatively low level of labour costs, the high standard of transport and telecommunication services and attractive living conditions. Together, these factors contribute to explain the rapid growth of Cyprus into an important regional business service and offshore centre for shipping, trading and financial and business services.

However, as mentioned clearly in the Commission's Forecasts on the Candidate Countries (European Commission, 2001, p12), "the Cypriot economy is becoming increasingly dependent upon tourism, and external vulnerability is growing… While growing dependence upon tourism does not present any immediate problems, the economy is becoming increasingly vulnerable to external shocks, above all from tourist markets such as the UK... The long run growth potential depends crucially upon whether or not Cyprus will be able to limit its dependence upon tourism and diversify into other service-related activities".

Since the mid 1980's, the Cypriot economy has been affected by a series of important structural changes. These include a dramatic decrease of the contribution of agriculture to GDP; a shrinking manufacturing sector mainly due to a loss of competitiveness because of a continued policy of protectionism; and finally, the rising cost of an expanding public sector suffering from a lack of productivity and resulting in a growing public deficit. These factors, added to the pressure of complying with EMU criteria,

[1] About 23% of the gainfully employed population are college and university graduates (Planning Bureau 1996, p19).

have put an increasing strain on domestic economic policy. To sum up, except for its dynamic business service sector, the economy of Cyprus is in urgent need of restructuring, if it wants to proceed successfully with European integration. Until now, it is clear that the country's ability to face the new challenges of globalisation is being seriously hampered by the slow pace of the effort[2] to press forward much needed reforms regarding deregulation, liberalisation, privatisation and harmonisation.

Having said this, it should also be mentioned that the economy of Cyprus has been going through an important period of transition since 1995 because of the application of GATT agreements and the ever-closer links of the country with the European Union implemented through a Customs Union agreement. This led to a dramatic reduction of import duties combined with measures of trade liberalisation and other forms of deregulation of the local economy. At the same time there has been a growing pressure on labour costs accompanied by problems of labour shortage, with an unemployment rate fluctuating around 3%.

There is no tradition of collaboration and trust either between companies or with the regional R&D infrastructure

Traditionally, Cypriot companies have been relatively isolated from R&D networks in Europe. This has probably also taken up its toll on the local innovation system, making it difficult to keep abreast of technological change in the global economy. Moreover, in a small country like Cyprus where family firms[3] compete among themselves on the local market, there is no tradition of collaboration and trust either between companies or with the local R&D infrastructure. The lack of swift progress in selected sectors, including high tech sectors, may also be linked to structural rigidities affecting the labour market in Cyprus. For decades, both the private and public sectors have been "sheltered environment" for growth and development lead by protectionist and interventionist industrial policies. As the Commission puts it, "Despite its comparative advantage in new technology with its highly educated and computer-literate workforce, Cyprus has largely failed to develop a significant internet-related service sector. This is in large part due to the excessive dominance of the state telecommunications company in the provision of internet services, which has limited the growth of the new economy" (European Commission 2000, p31).

Cyprus suffers from a very low level of R&D expenditure as a percentage of GNP

The first survey on the Science and Technology Potential in Cyprus was carried out in 1992. Compared to other small countries, Cyprus suffers from a very low level of R&D expenditure as a percentage of GNP. Indeed, R&D spending amounted to 0.2% of GNP, which is a very small figure,

[2] Partly to blame on various workers' unions and some political parties.

[3] In fact, Cypriot firms are generally very small with many micro-businesses: 88% of firms employ less than 10 people and only 1.4% of the firms employ over 50 people (Labour Statistics, Department of Statistics, 1996)

Manufacturing suffers from relatively low levels of technological development, with little support from public research institutions and an over-reliance on imported technology in a "packaged" form.

compared to other countries such as Slovenia (1.5%) or Mauritius (0.4%). In fact, the figure should be compared to an average for developing countries (0.65%) and an average for developed countries (3%) (Department of Statistics, 1992). It is also worth noticing that the lion's share of Cypriot R&D funds have gone to research in agriculture, leaving manufacturing industry with a very low level of research funding. Indeed, it is a well established fact that manufacturing suffers from relatively low levels of technological development, with little support from public research institutions and an over-reliance on imported technology in a "packaged" form (purchase of machinery, licensing, etc.). "The conclusion is that industrial research in Cyprus is virtually absent" (Hadjimanolis, 2000, p10). Having said this, it must be noted that the establishment of the University of Cyprus in 1992 (see Section 3 of this report), with a faculty of about 200 academics, has played an important role in boosting public funded research in Cyprus. Finally, another important milestone has been the creation of the Institute of Technology in 1991 and the Research Promotion Foundation in the second half of the nineties. The Institute is run as a private body and has developed a network of 180 consultants and partners whose task it is to improve productivity, with a particular focus on identifying developmental priorities for local firms.

Inward investment has been relatively slow during the last decade, which is probably due to the restrictions applied to such investments by the Central Bank (foreign ownership was limited to a ceiling of 49% for most businesses). However, during the last three years, major policy changes have taken place, allowing in certain case up to 100% ownership by foreign shareholders. Also, within the framework of the newly launched "high tech" policy of the government, foreign ownership and the importation of technology and know-how is strongly supported through government grants (see full description of the scheme later). There are a few examples of companies, which have benefited from inward investment and technology transfer, notably in copper mining, information technology, laser and solar power technology and fish farming.

A few examples of these new firms include *Demokritos* which is active in the field of information and communication technologies; *Promitheas* which aims to become an incubator for new high tech companies; *Hellenic Technical Enterprises* which is specialised in information technology hardware development, and *Hyperion Systems Engineering* which is specialised in process engineering.

Financial markets have developed considerably during the period 1999 - 2000.

Financial markets have developed considerably during the period 1999 - 2000. Indeed, in Spring 1999, the Cyprus stock exchange (where relatively little activity had been recorded until then) entered a phase of phenomenal growth, ending up as the best

performing emerging market in the world with an all index appreciation of about 700%. The development of the financial market was mainly based on domestic capital, with only a tiny proportion of funds originating from abroad. The bubble burst in spring 2000 but the financial market has now become an important component of the economic landscape of the island. Countless firms have been queuing up to become public companies. In the long run, this may lead to a shift away from an economy based on small family-run companies, towards an economy based on firms with stronger capital assets, foreign participation, a more professional and transparent managerial structure, and subsequently, an improved R&D potential.

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Having said this, the Cyprus stock market (which has a relatively high capitalisation in reference to the population of the island) is still dominated by traditional companies, and no small technology based firms have, as yet, raised money on the market. However, one can reasonably expect that this will happen in the near future, since this is already happening through the channels of investment companies. It is interesting to note, that these investment companies are starting to identify the growth potential of selected (high-tech) SMEs, a process which had not been taking place with traditional banks.

The Planning Bureau through its five-year plans has traditionally formulated industrial development policies in Cyprus. Until the 1980s, the classical approach of encouraging investment in machinery, mergers among local firms and the formation of public companies was adopted. During the 1990s it was proposed that Cyprus should adopt an industrial strategy based on the "flexible specialisation" paradigm. This included a sectoral approach, the need for co-operation among firms, technology upgrading, specialisation and attention to quality and innovation. At that time, it was felt that the Cyprus manufacturing industry should choose to compete in high quality niche markets instead of its traditional markets for cheap mass-produced goods in the Middle East, the Gulf and Eastern Europe. In parallel with the industrial strategy, foreign experts also proposed an integrated technology strategy for all sectors of the economy. However, "what actually happened in the following years was the implementation of some of the recommendations with substantial delay, while several others were just ignored. The government under political pressure made steps in the opposite direction e.g. by allowing imports of [unskilled and semi-skilled] labour" (Hadjimanolis, 2000).

The Planning Bureau through its five-year plans has traditionally formulated industrial development policies in Cyprus

Having said this, it is important to note that the economy of Cyprus has always been dominated by the service sector (trade, tourism, business services) and that manufacturing still remains a “poor relative”. In this tourism-and service-based economy, the “innovation framework” was not a real concern; the economy was focused on the exploitation of existing opportunities (sea and sun)

instead of the creation of new opportunities. This mentality gradually extended to the manufacturing sector, where a dominant reaction to structural crises consisted in shifting from production to import, distribution and retail, as witnessed in the shoe, furniture and clothing sector.

The possible development of the "innovation potential" of local manufacturing firms had been an implicit outcome of the work carried out by the "flexible specialisation team". However, these new ideas did not progress much for many years. Moreover, incentives which were made available at that time (and still exist today, such as financial grants for new technology, environmental protection or export of high tech products) were never really evaluated. The main problem was a lack of strategic coherence and concerted effort on the part of the government. Although a delivery system for a national framework of innovation had been put into place, there was no concerted mobilisation of its different participants. Instead of serving planned actions, the system remained redundant for many years. Things started to change during the last two years, mainly because of the development of a "critical mass" of more committed actors, including the Ministry of Commerce and Industry, the Planning Bureau and the Central Bank, who, together, put into place a wider range of incentives. Some of these actors have been positively evaluated (such as the Institute of Technology), others, like the Research Promotion Foundation are too new to have gone through an evaluation process, but show clear signs of a rapid development.

The Cypriot innovation system is characterised by its fragmented nature and the lack of integration and coherence between its different parts

To conclude, the Cypriot innovation system is characterised by its fragmented nature and the lack of integration and coherence between its different parts. Although it posses a rich institutional setting, it is lacking adequate policy delivery procedures if not the process of decision making itself, and is burdened by an inefficient public sector, which is often paralysed by its own structure of operation and various conflicting lobbies that participate in the policy making process. On the positive side, there is a buoyant economy, supported by a dynamic private sector, which offers the island an enormous potential for growth. There, lies an obvious challenge for public and private institutions alike to guide, support and activate a policy, which would help valorising these assets.

1.2 Main Developments in Innovation Policy

1.2.1 Introduction

For the last few years, there has been a change in government philosophy for economic development, and this is reflected in the New Strategic Development Plan, covering the period 1999-2003. The New Strategic Development Plan constitutes in essence a plan of harmonisation with the *acquis communautaire* and the forthcoming competition: "The first serious challenge arises from the harmonisation process itself and it constitutes the adaptation of its legal and institutional framework and policies with the full volume of the *acquis communautaire*…A more serious challenge, however arises from the creation of conditions of intensified competition brought about by the changing external environment of Cyprus in general, but also more specifically as a result of its accession course" (Mr. Takis Clerides, Minister of Finance, January 2000).

There is no doubt that the accession process has been instrumental in bringing innovation issues (as well as other relevant issues of the Cyprus economy) into the fore. As mentioned before, the need for adaptation of the Cyprus economy to the new European environment has become crucial because of the serious shrinkage of the manufacturing sector during the last decade, due to the erosion of competitiveness and associated structural problems of the economy. The awareness of the problem in policy making circles, has been fuelled by various reports of foreign experts, who were commissioned by the government to assess the status of the manufacturing sector and make suggestion for its restructuring.

There is no doubt that the accession process has been instrumental in bringing innovation issues into the fore

1.2.2 Policy Documents

The process of using innovation issues as a major tool for the promotion of economic development has already been started in Cyprus, despite the fact that there is no explicit government policy or document addressing this issue, as a self-contained policy guideline. There are however a number of key policy statements and schemes already implemented, which in one way or another, form a Framework for Innovation, at its infancy.

The process of using innovation as a major tool for promoting economic development, has already started in Cyprus, despite the fact that there is no explicit government policy or document addressing this issue

Table 1 - Main Policy Documents and Consultative Papers Since 1996

Title of Document	Organisation Responsible	Legal Status	Comments
The New Strategic Development Plan 1999-2003	Planning Bureau	Approved by the Council of Ministers	5-year plans are generally implemented
The New Industrial Policy Incentive and Support Policy	Ministry of Commerce, Industry and Tourism	Approved by the Council of Ministers	Implemented
Reengineering and Upgrading of Secondary Technical and Vocational Education	Ministry of Education and Culture	Draft pending	Proposal

The New Strategic Development Plan 1999-2003 (Planning Bureau)

Apart from the general philosophy of the Plan outlined above there are two additional issues indirectly addressing innovation, with reference to the knowledge infrastructure.

- The first is R&D (new knowledge and combination of existing knowledge). The New Strategic Development Plan 1999-2003 aims at raising the expenditure for R&D from 0,36% of GDP (0,18% in 1992) to 0,5% of GDP. The expenditure forecasted in the Plan for the period is CYP 12,6 million (21,79 million Euro)[4] of which CYP 6,6 million (11,41 million Euro) for participation in the Fifth Framework Programme.
- The second issue addressed in the New Strategic Development Plan 1999-2003 is Information Technology (dissemination and sourcing of knowledge). "The basic strategic objective of Cyprus within the frames of the Plan is the optimal utilisation of the possibilities created by the Information Society, in order to improve the competitiveness of the Cyprus economy and transform Cyprus into an international IT centre". (The New Strategic Development Plan 1999-2000, chapter 8-12 The information Society - Transforming Cyprus into an International IT Centre). The Plan provides for harmonisation-, development-, and infrastructure policies and measures, as well as an expenditure of CYP 15 million (25,95 million Euro) for promotion and implementation.

[4] CYP 1 = 1,73 Euro

In the New Strategic Development Plan 1999-2003, a lot of emphasis is placed on the promotion and support of networking

In the New Strategic Development Plan 1999-2003, a lot of emphasis is also placed on the promotion and support of networking in three key areas:

- Information Technology (data libraries, data exchange, telematics in the areas of medicine, education, training as well as electronic commerce).
- Research and Technology Development (aiming at the transfer of knowledge to the business community).
- Research & Development (with emphasis on use and synergies of various scientific research programmes).

From a more practical point of view, the New Strategic Development Plan 1999-2003 includes:

- An increase of the value added of the information sector at an annual rate of 8%.
- Upgrading of computer teaching and use in schools.
- Establishment of an "Informatics Council" to formulate relevant policies in the field.
- Introduction of a competition for companies which excel in exports of new and high technology products.
- Promotion of cooperation with foreign R&D institutions and involvement in EU funded schemes such as COST and others.
- Exchange of researchers with foreign R&D centres.
- Promotion of Innovation Relay Centres (IRC) in cooperation with the Greek Centre PRAXIS and later, through involvement in the 5fth Framework Programme.
- Allocation of CYP 4,5 million (7,78 million Euro) to the Research Promotion Foundation and an additional CYP 1.5 million (2,59 million Euro) for government funded research organisations.
- Participation in the 5fth Framework Programme with a contribution of CYP 6,6 million (11,41 million Euro).

An important achievement of the previous 5-year Development Plan (1994-1998) was the establishment of the Research Promotion Foundation in 1996. During 1997 and 1998 there were 165 applications for financial assistance under this scheme.

The New Industrial Policy (Ministry of Commerce, Industry and Tourism)

Establishment of a Research, Technology and Development Centre for applied research in areas of special interest (i.e. high tech areas in which Cyprus may have a comparative advantage).

This important incentive and support scheme has already been approved by the Council of Ministers and is currently at the implementation stage. The policy is divided into 12 chapters; five of them are directly or indirectly addressing the issue of innovation.

- The First Chapter provides for a complete package of incentives, financial resources and supportive services for the establishment of new **business incubators** (with emphasis

on high technology).

- The Second Chapter provides for the establishment of **a Research, Technology and Development Centre** for applied research in areas of special interest (i.e. high tech areas in which Cyprus may have a comparative advantage).
- The Fifth Chapter provides for government grants to cover the needs of industry in the areas of **testing, measurement and calibration**.
- The Seventh Chapter provides for the subsidisation of specialised **software in industry**.
- The Twelfth Chapter concerns an industry incentive scheme for upgrading and introduction of **new technology**.

Proposal for Reengineering, Upgrading and Modernisation of Technical and Vocational Secondary Education

This new policy document will introduce significant changes in secondary education, with an emphasis placed on technology, and more specifically Information Technology.

It also introduces the concepts of Continuous Learning and Life Long Learning at the technical and vocational secondary level.

SMEs Funding Scheme

The Central Bank of Cyprus announced this scheme in mid September 2000. It will be valid for 5 years as from 1 January 2001. In agreement with commercial banks a percentage of their liquid reserves shall be made available for funding new investments by SMEs and also for enhancing their capital structure (mainly for reinforcing working capital) under 7 year contracts. During the loan period the interest rate shall be stable and the loans will carry no risk for the commercial banks. The Central Bank shall undertake the risk for the loans.

It is interesting to note that for the purpose of the scheme the announcement defines SMEs as businesses with less than 20 employees, which is natural in an economy entirely dependent on SMEs. If the European criteria were enforced, few companies would be eligible for this scheme.

1.2.3 Institutional Infrastructure

There is no single authority/entity responsible for the promotion and co-ordination of innovative activities in Cyprus. However the new trends in government philosophy on economic development, as described in the introductory part, are shaped and promoted by the following institutions:

Planning Bureau

The Planning Bureau is responsible for the overall economic planning and it is involved in the formulation of strategy, the identification of objectives and the introduction of policy measures.

Institute of Technology

The Institute is a government funded, private, non-profit organisation, founded in 1991. It is responsible for the promotion of technological upgrading of the manufacturing sector. This is achieved mainly through funding schemes supporting studies on strategic/operational issues in industry.

Research Promotion Foundation

Established in 1996 (with a status similar to that of the Institute of Technology), the foundation serves as the national institute for the promotion of scientific and technological research in Cyprus.

New Business Incubators

The incubators as described previously, are expected to be operational towards the end of this year.

In a way all above institutions could become important players within a wider Innovation Framework set out by the government. Furthermore a number of other institutions created by the government (the Human Resources Development Authority, the Cyprus Development Bank, the Cyprus Productivity Centre) could become vital components of an innovative system, should clear directions and the policy guidelines become more explicit.

1.2.4 Implementation

The New Strategic Development Plan 1999-2003 is already in force as the official government policy. The financial resources are allocated through the State Budgets on a yearly basis and most of the institutions responsible for the implementation are in place. Some of the schemes of the New Industrial Policy are already fully operational, some others (like the business incubators) will become operational soon.

Nevertheless, as it has been said before, the new developments form an Innovation Framework at its infancy. It will take long before results are visible, provided that the much-needed structural changes and the concrete policy shall be implemented in a consistent manner. There are many stake holders involved and the balance of power amongst the social partners (state, civil service, employers' association, trade unions) will very much influence the effectiveness of the new approach.

The fact is that, due to the pressure by the accession process and the new economic environment, the awareness about the need for change is much broader now than it was ten years ago.

Table 2 - Major Government Funded Programmes and Initiatives in Favour of Innovation

Name of Programme; Initiative	Government Body Responsible	Objectives of Programme	Funding Available
Scheme for adoption of Standards	Institute of Technology	To establish and adopt standards	Up to CYP 6000 per case co-finance (10380 Euro)
Scheme for funding of Specialised Software	Institute of Technology	To fund the adoption of specialised software	Up to CYP 2400 per case co-finance (4152 Euro)
Scheme for Funding Research for access to Foreign Markets	Institute of Technology	Market research for improving penetration into foreign markets	Up to CYP 6000 per case, co-finance (10380 Euro)
Scheme for subsidising Consultancy Services	Institute of Technology	To subsidise the adoption of expert services	Up to CYP 8500 per case, co-finance (14705 Euro)
Scheme for Utilisation of the Internet	Institute of Technology	To improve the use of internet	Up to CYP 750 per case, co-finance (1298 Euro)
Scheme for Purchasing Technological Equipment	Institute of Technology	To improve the technology adopted	Up to CYP 20000 per, case, co-finance (34600 Euro)
Scheme for Overseas Market Research	Institute of Technology	To improve knowledge of foreign markets	Up to CYP 2000 per co, co-finance (3460 Euro)
Scheme for subsidies for Certification according to ISO / HACCP	Cyprus Tourist Organisation	To upgrade quality in the hotel industry	Up to CYP 8000 per case, co-finance (13840 Euro)
New Business Incubators	Ministry of Com., Industry and Tourism	To encourage the establishment of new business/products	Up to CYP 100000 per project, co-finance (173.000 Euro)
Testing and Laboratories for Quality Assurance	Ministry of Com., Industry and Tourism	To encourage industrialists to have their products tested and certified	Up to CYP 6000 per project, co-finance (10380 Euro)
Annual Call for Research Projects in selected areas	Research Promotion Foundation	To promote research and encourage scientists to deal with research	Up to CYP 30000 per project (51900 Euro)
Annual Call for Research Projects in selected areas	Research Promotion Foundation	To promote research among young researchers	Up to CYP 25000 per project, co-finance (43250 Euro)
Annual Call for Research Studies in selected areas	Research Promotion Foundation	To promote research networking between Cyprus and Greece	Up to CYP 15000 per project, co-finance (25950 Euro)
Incentive Scheme for Expert Services in the Field of HRM	Authority for HR Development	To encourage-support better utilisation of HR	Up to CYP 3250 per project, co-finance (5623 Euro)
Scheme for encouraging Mergers, Joint Ventures, and Subcontracting	Ministry of Commerce and Industry	To subsidise relevant consultancy services	40% of study fees and up to CYP 7500 per case (12975 Euro)

1.3 The Innovation Policy Community

1.3.1 Government Ministries/Departments responsible for the design of innovation policy, and Agencies and other Organisations responsible for implementing innovation policy.

There is no single department with a co-ordinating role for the design of innovation policy. However, the Ministry of Commerce, Industry and Tourism appears to take a leading role in areas relating to industrial innovation

There is no single department with a co-ordinating role for the design of innovation policy. However, the Ministry of Commerce, Industry and Tourism appears to take a leading role in areas relating to industrial innovation. Other ministries which take initiatives in shaping innovation policies are, the Ministry of Agriculture, Natural Resources and Environment, the Ministry of Education and Culture, and to a lesser extent, the Ministry of Health and the Ministry of Labour and Social Insurance, in the sense that it has an administrative role over a number of colleges for professional and technological training. A comparatively leading coordination role is played by the Planning Bureau, which operates to a certain extent, as an inter-ministerial body in the sense that it prepares the 5-year Development Plans and monitors the allocation of funds.

The major thrust of the related innovation policies is channelled through organisations and departments as follows:

Ministry of Commerce, Industry and Tourism

The Department of Industry, through the New Industrial Policy, and through the support given to the Institute of Technology (IOT), a public-private partnership for the upgrading of industrial and managerial practices and strategic approaches to business practices. The IOT, also runs schemes for technology transfers and for innovation brokerage.

Furthermore, the Office of the Official Receiver and Registrar of Companies falls under this ministry. In addition to keeping records of company registrations and approved trade marks, also acts as the Intellectual Property authority and a Patents office.

Ministry of Agriculture, Natural Resources and Environment

The main outlet for the development and promotion of innovative practices is the Agricultural Research Institute (see section 3), with substantial contributions in applied research in the fields of new plant varieties and animal husbandry.

Ministry of Education and Culture

It has introduced the subject of Technology and Design in the school education programmes. It also sponsors, in cooperation with the IOT (see above), Young Inventors Fairs and Competitions. Furthermore, the new policy document for reengineering secondary technical and vocational education is expected to promote new technologies, especially information technologies.

Ministry of Health

It supports and promotes the work of the Cyprus Institute of Neurology & Genetics (CING, see section 3), which carries out applied and -to a lesser extent- basic research in the field of genetic diagnosis and genetic diseases.

Planning Bureau

It manages and supports the newly established Research Promotion Foundation. It, also, acts as a policy link between Government and the European research and innovation programmes.

Ministry of Labour and Social Insurance

It supports and promotes the work of the Human Resource Development Authority which funds and promotes modern industrial and business development through training schemes, and it administers the operation of the Higher Technical Institute, the Higher Hotel Institute and the Cyprus Productivity Centre.

Table 3 - Government Funded Agencies

Organisation	Status	Main Responsibilities	Elements of Assessment
Department of Industry	Governmental department	Formulation and promotion of industrial policy	Government audit systems
Institute of Technology (IOT)	Non-profit foundation	▪ Upgrading industrial and managerial practices ▪ Technology transfer schemes ▪ Innovation brokerage schemes	Board of management
Office of Official Receiver and Registrar of Companies	Government department	▪ Trade marks ▪ Intellectual property office ▪ Patents office	Government audit systems
Agricultural Research Institute	Government department	Agricultural research	Government audit systems
Cyprus Institute of Neurology & Genetics	Non-profit foundation	Medical and biological research	Board of management
Research Promotion Foundation	Non-profit foundation	Promotion of research in the private sector	Board of management
Human Resource Development Authority	Semi-governmental organisation	Promotion of industrial and business training for development	Board of management

1.3.2 Knowledge Providers

The main knowledge providers, which could support and promote innovative thinking and practices, are:

The University of Cyprus

Publicly funded, with about 220 academics (permanent, temporary and special scientists) and about 2550 students. Research is carried out in physics, chemistry, computer sciences and other academic disciplines.

The Higher Technical Institute (HTI)

Publicly funded, with applied research activities concentrating on industrial processes and solar energy. The HTI has about 525 students.

The Mediterranean Institute of Management (MIM)

Publicly funded, with activities concentrating on training of business people and the application of modern management ideas and practices.

The Institute of Fashion

Publicly and privately funded, with focus on the development and use of innovative designs in the clothing industry.

Business Training, Consultancy and Research Units of Private Colleges of Tertiary Education

Some of the major private colleges of higher tertiary education (see section 3) have been increasingly involved in applied research work in the field of market research, management training, economic and business consultancies (including participation in E.U. programmes).

Table 4 - Main Knowledge Providers

Organisation	Main Type of Service Provided	Commentary
University of Cyprus	Undergraduate, graduate and postgraduate programmes; research activities	Mostly funded by government budgetary allocations; some external grants for research through EU programmes and other funding bodies.
Higher Technical Institute (HTI)	Technician engineer programmes	Mostly funded by government budgetary allocations. Links up with industrial firms.
Mediterranean Institute of Management (MIM)	Postgraduate diploma programmes in modern management	Funded by government budgetary allocations. Links up with business firms and with EU programmes.
Institute of Fashion	Training and guidance in clothing fashion design	Funded partly by government grants and by the Clothing Industry Association. Some fees charged to individual clients. Close links with industry and the Employers' Federation.
Private Colleges of Tertiary and Higher Education	Business training, consultancy and applied research	Self-funded activities

At this stage, there is no provision for the establishment of Technological Parks.

1.3.3 Other Stakeholders

Other stakeholders also promote development policies, which could contribute in an indirect way to the formulation and implementation of innovation policies. These include the Cyprus Federation of Employers and Industrialists and the Cyprus Chamber of Commerce and Industry and their sectoral organisations (e.g. clothing, footwear). They are actively involved with governmental organisations and other agencies (such as the Institute of Technology, the Institute of Fashion, the Human Resource Development Authority) and act as pressure groups for the formulation of appropriate government policies (such as in the case of the creation of business incubators).

1.4 Assessing innovation potential: data collection, surveys and indicators

The only step towards the collection of innovation related data was the "Research and Development Statistics 1991-1992"

As it has already been mentioned before, innovation policy in Cyprus is implicit – and not explicit. This is also why there are no explicit data referring to innovation indicators.

The only step towards the collection of innovation related data is the publication of the "Research and Development Statistics 1991-1992" by the Department of Statistics and Research. No

previous attempt had been made in Cyprus to collect such data. For the purpose of international comparisons and for conceptual and methodological reasons, this survey used the "Frascati Manual" (OECD, Paris 1981). However, because of a lack of basic statistical material and information, the survey of the Department of Statistics and Research has not been widely used.

In 1999 PricewaterhouseCoopers undertook a study on "The Potential of RTDI in Structural Support Schemes for the enlargement of the EU" on behalf of the European Commission (DG Research). Among other things, the study examined the case of Cyprus and the performance of its RTDI system. However, very few new quantitative data were presented, and the study was mainly based on tentative revised figures prepared by the Planning Bureau (PricewaterhouseCoopers 1999).

In 1999 and 2000 another questionnaire was circulated by the Department of Statistics and Research for the purpose of preparing a new report.

Regarding other data or studies on innovation, no publicly available information has been brought to our attention except some academic research by Hadjimanolis (Hadjimanolis 2000, Hadjimanolis and Dickson 2001). Government statistics on the financing of promising start ups, the number of business enterprises cooperating with research institutions, or the number of "exchange researchers" working for companies, are still non-existent. Regarding venture capital and high tech start-ups, although there has been a growing activity in this field in recent months, especially after the boom of the Cyprus Stock Exchange in the latter part of 1999, there are no statistics to document the creation of new firms. However, our own observations have identified a limited number of such firms. Most of these firms are involved in applied research, incubator operation, and the production and sales of software.

Regarding venture capital and high tech start ups, although there has been a growing activity in this field since 1999, there are no statistics to document the creation of new firms

Other studies/reports prepared by the Research Promotion Foundation limit their scope to science and research issues, with little reference to innovation.

1.5 Legal and administrative environment for innovation

This section reviews the tax incentive structure for innovation, efforts undertaken to attract Foreign Direct Investment, and procedures for company registration and patenting. The section starts with a brief review of competition law in Cyprus, since this can also affect the framework conducive to innovation.

Competition Law

During the last two years Cyprus has continued to make progress in the alignment and enforcement of its anti-trust policy. Competition is the responsibility of the Ministry of Commerce, Industry and Tourism, through the Competition and Consumer Protection Service. The Competition Law 207/89 was harmonised with the European Union directives A85/86 and A81/82. The New Industrial Policy foresees a special Chapter on Mergers, Acquisitions and Sub-contracting, which foresees government grants and tax relieves to cover part of the cost of the merger or joint venture. Similar grants are also available for companies engaged in sub-contracting with either local or foreign companies. There are indications that relatively few proposals have been submitted for this particular scheme.

Tax incentives for innovation

There are no special tax incentives or reduction of social charges for innovation activities

In Cyprus there are no special tax incentives or reduction of social charges for innovation activities as such. There is however a provision for tax breaks related to investments in equipment for the manufacturing industry. Another incentive, which has been discussed for years, is the ten-year tax holiday for new products. It has been used until 1990 when it was abolished. In 1993 a decision was made to reintroduce this incentive for new high tech-products. Although a lot of background research had been done to prepare this particular ruling, the major stumbling block remained the lack of consensus around the definition of "high tech products". The most recent development in this matter was to ignore the "high tech" character of the products and to reintroduce the ruling more or less as it was before, keeping the tax incentive for *new* products in general which also covers high tech products (at least if these are new). It is expected that the government will proceed with this measure during 2001. One possibility will be to set up an *ad-hoc* committee to look at each particular application individually.

To sum up the situation in Cyprus during the last decade, the only schemes available are the ten-year tax holiday (for "high tech" and/or "new products") and the recently implemented New Industrial Policy. The next item on the agenda of the Ministry of Commerce and Industry is a scheme that will give incentives to industry to improve their products and carry out research.

So far services have not been considered in the New Industrial Policy, which applies only to manufacturing industry, although a wider definition of manufacturing industry has and will be used (covering sectors such as software development). In fact, when one is talking about high-tech, it is not possible to have strict boundaries between industry and services, and the government is willing to consider applications in a wide range of activities as long

as there is an *end-product* (for instance a database can be an end-product).

The existence of an important offshore centre in Cyprus should also be mentioned here. The Cyprus offshore sector covers a wide range of activities, including shipping, re-export and financial services, and Cyprus has developed into a strong Regional Business Centre during the last decade. A special regime of taxation applies to offshore companies: corporate profits are taxed at 4.25% compared to 20% or 25% for on-shore companies. Foreign personnel of off-share companies pay half the rate of income tax. There are concerns about these preferential tax incentives and the authorities have announced their intention to eliminate any preferential treatment by 2005. Having said this, the sector is very important for the economy of the country: there are about 42000 registered offshore companies in Cyprus, which employ 3000 non-Cypriot and 2500 Cypriot nationals. It is estimated that the sector generates about 4.4% of GDP.

One-stop-shop (Foreign Investors Service Centre)

In its effort to encourage the inflow of foreign direct investment, the Ministry of Commerce, Industry and Tourism has set up an Investment Centre in Nicosia, in the premises of the Ministry (chapter three of the New Industrial Policy). Operations started in November 2000 and the Centre operates as a Department of the Ministry. It is foreseen that the centre will also serve the needs of local companies in the future. The Centre will:

- Provide information to investors regarding financial, legal and taxation matters.
- Provide advice to potential investors regarding the most effective way of making use of the package of the various benefits offered (e.g. grant schemes).
- Will be responsible for examining applications submitted to the Central Bank for projects in the manufacturing, trade, tourism and energy sectors, where foreign participation exceeds 49 percent or when the cost of the project is over CYP 750.000 (1.297.500 Euro) Otherwise, applications are processed by the Central Bank.
- Will act as a *liaison* with various government departments and facilitate the acquisition of the required permits / approvals (e.g. Central Bank permit, work permit, etc.) required for implementing a project.

Registering a company or a partnership is a simple procedure. The registration of a company with limited liability is a more expensive procedure but can be done within a week.

It is interesting to note that in January 2000, Cyprus eliminated the controls on FDI for investors originating from the EU. Restrictions still exist for investors from third countries. These new regulations are a clear step towards the abolition of capital controls.

Company registration

Administrative procedures are designed according to the Anglo-Saxon system and are relatively effective. Registering a company or a partnership is a simple procedure, registration of partnerships is even easier, and there is no need to pass through a lawyer. The registration of a company with limited liability is a more expensive procedure (for which the services of a lawyer are needed) but can be done within a week or two. The cost is about 3150 Euro (CYP 1800) and there is no minimum invested capital required. The procedure is extremely simplified and the only obligation is to submit audited accounts to the Registrar of Companies every year. The auditor will also prepare a special note concerning the taxation ("Income tax report")

Starting a company in Cyprus involves procedures similar to the ones applied in the rest of Europe (Cyprus follows the English legal system). Foreigners wanting to set up an offshore or onshore company need to pass through the Central Bank in order to be able to repatriate their profits (this limitation has been gradually abandoned ever since exchange control regulations have been relaxed, especially after 1 January 2001). The establishment of the "Foreign Investors Service Centre" (one-stop-shop discussed before) will facilitate the gathering of information by potential foreign investors, but candidates still need to go through the Central Bank and the Immigration Department. As mentioned before, the Central Bank now allows for 100% ownership of companies if the owners originate from the EU.

Patenting

Cyprus is a member of the European Patent Office (EPC) and also a signatory of the Patent Cooperation Treaty (PTC). That is, any Cypriot can register his or her patent through the National Office, for any European country that is member of the EPC or the PCT. Since Cyprus has joined the European Patent Convention, the law is compatible with most European Patent norms, and no harmonisation problems are expected in this area.

The government does not provide financial grants to assist companies to draft patents, except through the newly implemented incubator scheme, which also covers patents registration

The government does not provide financial grants to assist companies to draft patents, except through the newly implemented incubator scheme, which also covers patents registration.

The registration of patents has been available in Cyprus since 1911 when a Trade Marks Section was created at the Customs Department in Larnaca. Until 1998, the number of patents registered in Cyprus ranged between 1000 and 1500 (protection of non-Cypriot inventions in Cyprus). During that time, the government used re-registration from UK-registered patents. During the same period, about 15 patents were initiated in Cyprus

(from Cypriot inventors). Joining the EPC has changed the picture drastically. During the first year of membership, about 34,000 patents were registered in Cyprus. What happens is that when patents are translated into Greek, they can be registered in Cyprus for a small additional fee. It seems that Cyprus is considered to be a good place for foreign investments, for transporting, handling or even manufacturing of goods for export to the Middle East, Eastern Europe, and North Africa; even if goods are just passing through Cyprus, these products need to be protected. It is also true that Cyprus has been developing into an important consumer market, which has attracted more attention by patent holders.

Until today, there has been only 2 or 3 patent registration initiated in Cyprus on average every year. They originated from many different sectors such as solar energy, chemicals, building materials, or pharmaceuticals. For the moment, this remains a small number, but it is expected that it will increase with time. People will gradually become aware of the facility to register patents *in Cyprus* (as opposed to a UK re-registration), they will not need (as it was the case till 1998) to link up with the British.

Cypriot participation in the patent system will become more evident during the next five years. The office of the Registrar of Companies even plans to hold road shows in many cities so that people will be aware of the patent system. However, the actual drafting of patents is a complicated issue (claims have to be formulated in an appropriated language) and Cyprus lacks trained people who have the scientific and legal background for such tasks. This means that interested parties still need to rely on foreign expertise for that matter.

It is also interesting to note that there are no specific schemes to help researchers at the University of Cyprus (or any other research institution in Cyprus) to valorise potential patented invention in the private sector. In other words, there are no specific arrangements to offer the opportunity to researchers to create new companies in which they can exploit patents developed in their academic capacity.

In the field of industrial and intellectual property rights, Cyprus trademark law is already is line with the *acquis*, but further legislative and enforcement measures are needed regarding copyright. A special unit, the IPR Management Centre, which is part of the Department of the Registrar of Companies, deals with Intellectual Property Rights issues and enforces effective border controls.

If the Ministry of Commerce and Trade manages to implement successfully its policy of technology transfer and innovation (see the New Industrial Policy), most patent registrations will originate

in the future from industrial activities, in particular the information technology industry (mainly software). It should be noted, however, that it was originally expected that the innovation policy would mainly benefit sectors such as solar heating, laser technology, energy conservation, water desalination, and water saving and purification, which are directly relevant to the Cyprus context. Unless the government decides to fund research in these –more capital intensive- fields, it is probably the information technology industry that will first benefit from these newly launched innovation schemes (i.e. New Industrial Policy).

Conclusion

This section clearly shows that, except for tax incentives for innovation, all the other elements that contribute to the creation of an infrastructure conducive to innovations are in place. These include an efficient patenting infrastructure, easy and simplified procedures for company registration, the establishment of a foreign investors information centre, and a harmonised competition law.

Regarding tax incentive to promote innovation, the government should seriously consider giving tax benefits to companies, which are involved in R&D, and this should not be limited to the companies located in the incubators (and other measures provided for in the New Industrial Policy). This issue requires urgent action at the policy making level. If implemented, such policy could in turn, solve the existing imbalance, which is affecting the research infrastructure, which is almost exclusively concentrated in the public sector. R&D must also be carried out in the private sector, and this could ideally be promoted through the implementation of tax incentives for companies, which invest in R&D. Such a new policy may also contribute to solve the wider problem of the "atrophy" of the research infrastructure in Cyprus, which is discussed later in this report..

Sources

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Section 2 - Measures to foster innovation in business

2.1 Training and human resource programmes in favour of innovation

In Cyprus, the recently renamed Human Resources Development Authority (HRDA), previously called Industrial Training Authority, is responsible for training and covers all sectors of the economy, looking at all kinds of human development issues. It is a semi-governmental organisation governed by representatives of employers, unions, and the government. In Cyprus, a levy of 0.5% of the wage bill is paid by all employees of the private sector (government and semi-governmental organisations are exempt). This source of income is used to finance the main policy instruments used to encourage direct training and human resource programmes for all sectors of the economy by the HRDA.

The HRDA has a research department, which covers training needs analysis, national and sectoral human resource planning, identification of needs for additional human resources and labour, and other labour market issues. It also covers evaluative research concerning the effectiveness of the policies that are implemented.

The HRDA has several schemes on offer:

- A scheme to support institutional training.
- A scheme, which supports in-house training, which takes place in companies.
- A scheme, which supports training abroad.
- A placement and training scheme for graduates in Cyprus and practical training for students in certain areas.
- A scheme to support consultancy services on human resource issues. These grants are intended for private consultants who provide services to companies in the fields of human resource management, human resource development issues, organisation, remuneration, recruitment, development evaluation, etc. As from 1st of January 2000, the HRDA is also offering another consultancy scheme, which is specifically directed to small businesses.
- A scheme to support training infrastructure (not directly the training programmes as such, but the creation of conditions to facilitate training, including training of trainers.

In addition to this list, a recent major project, which is being developed, is the setting up of vocational qualifications in Cyprus, which will basically follow the UK model.

High priority training programmes designed specifically for smaller (family) businesses, include: product design, the use of new technologies in the production of services, etc.

Every year, the HRDA publishes a list of "programmes of vital importance" or "high priority programmes" which is sent to all institutions that provide training in Cyprus. This list is established by the HRDA itself (it is done internally), and the aim is to encourage institutions to submit programmes under specific categories of actions featured in the list. The HRDA encourages training in these areas and is also more generous in the subsidy that is allocated. One such area covers programmes designed specifically for smaller (family) businesses. Another example includes strategies for mergers and acquisitions, while emphasis is also given to communication and information technologies, human resource development, product design, the use of new technologies in the production of services, quality, management, marketing of tourism in particular foreign markets, environmental management, and the application of international standards of production. In all these areas, the HRDA is more demanding in terms of the structure of the programmes and the quality of the trainers, but the subsidy can be much higher than in conventional areas of action. It is probably in this respect that the HRDA contributes to spreading innovation in Cyprus.

The HRDA subsidises actors to provide training services. With the necessary direction and incentives from the HRDA, there is a multiplicative effect, which explains why today there are about 200 institutions involved in training in Cyprus. This is also the case in the field of consultancy where there are many private consultancy companies dealing with human resource development issues. Before the introduction of the HRDA schemes, there were practically no such companies. Therefore, the "system" seems to work well, despite, or perhaps because the HRDA has no executive role to play.

There is one programme however, for which the HRDA undertakes an executive role. This relatively innovative programme is called "Business Development Programme". It is a one-and-a-half year programme for owner managers of businesses, which aims to take these managers through all the main steps of managing a business. The owners have to put through a business plan in process so that at the end of the programme, they have their own business plan, which they can then start implementing. This scheme is innovative because it is very special in terms of the programme's methodology. It is a regular weekend residential programme with a group of twenty people, which gradually develops into a strong team. There is a lot of interaction and each one is helping the other, it is more than just a series of lectures. There is also a counsellor who visits participating companies for the equivalent of one day per month.

His or her role is to implement with the owner manager the material that has been covered during the workshops. So it is a programme that gradually develops by taking the owner manager through a learning process. He or she learns how to deal with people, how to network, how to plan, how to introduce new systems in the company.

The above programme is designed for developing companies that show a clear potential for growth. It is probably one of the most innovative schemes in terms of its methodology. The scheme is not unique to Cyprus, it has been initiated in Ireland by the Irish Management Institute and it is now implemented in a number of countries in Europe with exactly the same principles.

In recent years, and more specifically since 1999, the HRDA has been involved in the establishment of a National System of Vocational Qualifications. This foresees among other things, the development of vocational qualification standards, which will constitute a major step in the establishment of a transparent system of mutual recognition of qualifications in Europe. Until today, five standards have been prepared and the Authority is ready to proceed with the final testing and implementation phase. If results are satisfactory, the pilot scheme will be extended to a large number of qualifications. In the light of the fact that vocational training is of great importance in Cyprus (see later in this section), it would be legitimate to ask why relatively little progress has been done in this field. Swift progress on this matter is of paramount importance.

The annual budget for the HRDA for 2000 was CYP 8 million CYP (14 million Euro), which included CYP 5.5 million (9,51 million Euro) used exclusively for subsidies. There is no other source of finance for training purposes in the private sector in Cyprus. The public sector has its own institutions, which include the "Public Administration Academy", and some government institutions like the government's "Productivity Centre". There are also some opportunities through European programmes, like the Leonardo scheme.

One of the merit of the HRDA is that it carries out research on the real needs of business in Cyprus, including small and micro-companies

The HRDA is also involved in the European Training Foundation (Turin, Italy). This is the European Union's training organisation, which deals with all education and training issues. These activities are particularly important for countries of Eastern Europe and the Former Soviet Union and also Mediterranean countries. Cyprus has two seats on the advisory board. The HRDA is also a member of the European Foundation for Management Development.

Concerning the accession procedure, there were no major issues of harmonisation. The only issue, which has to be dealt with in the near future, concerns the vocational qualifications. The Commission is giving a lot of importance to this issue because it is

trying to create a system of mutual recognition of vocational qualifications across Europe.

As mentioned before, one of the merits of the HRDA is that it carries out research on the real needs of business in Cyprus, including small and micro-companies. Having said this, it would be interesting to learn how local entrepreneurs perceive the activities of the HRDA, and how independent international experts in the field, judge the contribution of the Authority. This could tell us for example; whether the Authority has invested sufficient effort in its strategic thinking to anticipate possible changes in the labour market (i.e. a dynamic appraisal of the need of new skills in the future); or whether sufficient attention has been paid to simplify and shorten the procedure to obtain funds for training. The Authority carries out its own evaluation (approximately every two years) based on a questionnaire survey regarding specific schemes and/or the Authority's overall activity. The HRDA is also subjected to the screening process operated by the European Training Authority in the context of its Annual Review of Activities. However, it could be argued that these initiatives fall short of a proper in-depth independent evaluation procedure, that would tell us how well the Authority understands, analyses, and monitors the needs of the local firms, and how concrete actions are taken to adequately meet these needs. When dealing with a public or semi-public authority, there is always a risk that actions and programmes are mainly supply-driven. When this is the case, institutions may find themselves locked in situations in which the "reproduction of their own pattern of operation" takes the upper hand.

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Table 5 - Main organisations involved in human resource development for innovation

Higher or further education organisation	Main type of innovation related training or advisory services	Commentary (e.g. efforts made to re-design courses in partnership with industry, etc.)	Involvement in networks (e.g. TEMPUS, etc.)
Training and development units of *Intercollege*, *Cyprus College* and the *Frederick Institute of Technology*	▪ Business development centres ▪ Seminars on entrepreneurship ▪ Strategy for SMEs ▪ Ensuring the survival of small family businesses ▪ Sustainable tourism in Cyprus ▪ Short courses for stock exchange ▪ Working towards development of an incubator	▪ The government through the HRDA subsidises many training courses and in particular, in-house training, seminars and training abroad	Leonardo da Vinci

Lack of qualified workers: a major problem for Cyprus

Cyprus suffers from a lack of qualified technical workers, people who are skilled with their hands and there is an urgent need of a better system of vocational and technical training. For example, there are enough carpenters, plumbers, fitters but the question remains whether these people are skilled enough in the modern sense of the term. There is also a lack of enough skilled people: the explosion of the service sector (in particular the information technology and financial sectors) has created a huge demand for accountants, experts in financial services, IT specialists and other highly qualified engineers. On the other hand, some professionals such as architects, lawyers and medical doctors are sometimes under-employed because of lack of opportunities due to the reduced size of the labour market. The unions are generally opposed to allow foreign workers to come to Cyprus, but the trend of further liberalisation is inevitable. Cyprus has to become an international workplace and at the same time, it should protect its own workers through improved training. Cyprus definitely needs a revalorisation of vocational training. The message has to be passed on to students and teachers alike, to ensure that these particular studies regain their importance in society.

There is no lack of formal training infrastructure but what is often missing is a culture of entrepreneurship, the ability to develop intra-organisational innovations and to overcome, in some ways, the deeply rooted mentality of family entrepreneurship.

Technical and vocational Education in Cyprus: a possible answer to an important problem

The current situation and some planned changes in the system of technical education in Cyprus are briefly discussed, especially aspects related to the creation of an innovation culture and the successful introduction of an innovation policy in the economy.

A draft report making suggestions for the re-engineering and upgrading of the secondary and vocational education in Cyprus has been released in June 2000 and is currently subjected to a public discussion with all parties interested in technical education (TE), including industry.

The report examines first the current problems of TE, which can be briefly summarised as follows:

- Inadequate infrastructure (rooms, laboratories, educational equipment, computers).
- Low educational level of pupils (only the weakest pupils of high school –gymnasium select technical education because their standard is too low for the lyceum).
- There is an increasing demand for TE, which currently cannot be fully met.
- The content of TE is considered as outdated and does not meet the demands of the market place.
- TE is offered only to pupils in school age, while there is a large number of inadequately educated workers and technicians in industry, who could also benefit from special programmes, designed for them.
- TE has rather weak links to industry.

The philosophy of the proposed changes is to correct inefficiencies, modernise TE, make it a part of lifelong education, and adapt it to the current needs of the economy forging permanent links between the school and industry.

The proposed changes are outlined as follows:

- Introduce personal computers as a necessary tool in classrooms and laboratories, in order to familiarise students with modern information technology and its possible applications in advanced manufacturing.
- Introduce new specialisations in the curriculum, as defined by the assessment of needs of industry, which is carried out on an annual basis by the HRDA.
- Introduce new elective subjects of special interest like economics, marketing and ecology. Emphasise information technology, advanced manufacturing technology (computer numerically controlled machines, robotics, etc.) in core technical subjects.

- Promote innovation in teaching methods, laboratory practice and industrial training placements.
- Expand the scope of technical education with specially designed evening programmes for young workers and technicians in industry who would like to upgrade their knowledge and obtain a vocational qualification.
- Increase cooperation with industry
- Built flexibility in TE to allow continuation of studies in universities, but at the same time, make its graduates immediately employable in industry without expensive on-the-job training.
- Introduce separate vocational education for those not capable or interested in TE, but desiring to get practical training in a technical vocation (builders, plumbers, etc.). The current combined training drains resources from TE and creates many problems (low discipline in school and weak follow up of pupils in the vocational education during their practical training in industry).

The report makes specific suggestions for innovations in TE in order to implement the above changes. These include the formation of a Consultative Board for TE with members from education, professional engineering organisations, trade unions, the Industrial Employers' Federation etc. This Board will offer guidance and promote the need for change.

Another interesting suggestion is the systematic further training of teachers (technical educators) and their secondment to industry. The purpose is to upgrade their skills and knowledge in modern manufacturing methods and forge links with industry.

The report suggests also the complete restructuring of the administrative structure of TE with the creation of three separate departments, i.e. a research and curriculum development department, a teaching personnel department and an administration and finance department.

The implementation of the suggestions implies building new technical schools and upgrading the existing ones, setting-up a separate vocational education system in its own schools, purchasing laboratory equipment and hiring additional teachers. The budget for all the above-mentioned changes is around CYP 15 million (25,95 million Euro) for the next five years, i.e. around CYP 3 million (5,19 million Euro) per year. The size of the budget makes it doubtful whether the changes will be implemented within the prescribed time scale.

2.2 Awareness and use of innovation management techniques

Policy awareness of innovation management techniques (IMT)

The New Industrial Policy (NIP) makes only indirect reference to the need for learning and applying innovation management techniques. The policy concentrates on two main issues. The first is the development of new technology firms in incubators, together with the establishment of an industrial research organisation. In parallel with the above, as the second major issue the restructuring and support of the existing industrial sectors is planned. The policy (NIP) emphasises the creation of incubator centres and related infrastructure and the provision of motivation for restructuring through grants and tax concessions. The lack of training in innovation management techniques is not explicitly recognised as a barrier to innovation or is probably considered as a minor one, which can easily be addressed once the major barriers of the inadequate infrastructure are dealt with. It is not anyway a separate action line of the industrial policy.

The new industrial policy (NIP) makes only indirect reference to the need for learning and applying innovation management techniques

The incubator centres will, as anticipated by NIP, supply physical facilities and services, but also advice and support. The preparation of business plans and financial planning are specifically mentioned, while innovation management is not. From recent discussions with incubator administrators and government officials the need for training in entrepreneurship and innovation seems to be at least recognised, although not as a first priority. Training in entrepreneurship is mentioned as an essential ingredient for success for people starting a new technology venture in incubators (as reported in the document regarding a visit to Ireland undertaken by the technical committee, which prepared the NIP).

Training in entrepreneurship is mentioned as an essential ingredient for success for people starting a new technology venture in incubators

The New Industrial Policy includes a separate plan for the upgrading and introduction of new technology in existing industrial firms. This plan includes incentives and support for purchasing new advanced technology machinery and the development of new products. The capacity to adopt a new technology is implicitly assumed, and similarly, it is also assumed that the firm will evaluate the effects of the newly implemented technology on its performance, and adjust its actions accordingly.

The consultancy schemes promoted by the Institute of Technology (IOT) are directly relevant to the plan for upgrading existing industry in Cyprus. This policy is a continuation of previous policy schemes and includes the provision of subsidised

consultancy services through a network of accredited consultants by the OIT. The Institute has determined a number of areas for the consultancy studies and grants, which include technology and quality. Innovation is not mentioned as such, although studies on technology include cases of technological innovation (advanced manufacturing technology, design management, R&D management). The IOT organises seminars and training sessions for the accredited consultants. Some of them are related to the introduction of new technology.

Needs assessment surveys

A lot of emphasis has been put on human resources management and small firm management, but seminars dedicated to innovation management techniques are rather rare

The Human Resources Development Authority (HRDA) carries out research on industrial needs, and provides guidelines for training. It also carries out a survey on the market demand for various occupations including scientists and engineers. The HRDA organises its own seminars and subsidises others organised by approved training institutions. A lot of emphasis has been put on human resources management and small firm management, but seminars dedicated to innovation management techniques are rather rare. Some seminars on creativity enhancing techniques have however been organised. The HRDA also subsidises training in new technology abroad or locally, with foreign consultants.

Academic research

Even innovative firms in Cyprus are not fully aware of the vast array of innovation management techniques, which have been developed. The firms make little or no use of them.

Academic research carried out in 1995 and 1996 (Hadjimanolis, 1997, Hadjimanolis and Dickson, 2000) has investigated several issues of innovation management in small and medium sized manufacturing enterprises in Cyprus. The awareness and use of innovation management techniques were also covered by the research and were investigated through case studies. It was found that even innovative firms in Cyprus are not fully aware of the vast array of innovation management techniques available to them. Hence, one of the policy recommendations of the research was the organisation of seminars concentrating on such techniques.

While looking in some detail into innovation management techniques, one can see that some of them, in particular project management, creativity techniques and product life cycle analysis, are relatively well known among the most sophisticated local firms, even if not adequately applied. Innovation audits, technology evaluation analysis, new product development best practices and quality function deployment are relatively unknown among local SME managers, including those who are well trained in managerial techniques.

The conclusion from the case studies was that while managers are well aware of infrastructural deficiencies and their physical internal barriers to innovation (lack of resources and technological knowledge), they are not equally aware of the importance and relevance for their firms, of innovation management techniques in general.

One of the main reasons for the low use and development of IMTs in Cyprus is the small size and the family character of firms and the fact that most firms do not use sophisticated technology. Their management methods are rather informal while the nature of developed or adopted innovation is largely incremental. Small firms may also lack the necessary resources to use innovation management tools.

Institutions with potential for training in IMTs

The University of Cyprus has a department for Public Sector Administration and Business Administration. Its research is mainly concentrated in management science topics, finance and export marketing. Innovation management is not yet included in the research programme and is not offered as a subject in the curriculum.

The only course related to innovation management is the postgraduate, MSc level engineering management course of the Cyprus International Institute of Management. However, the degree course is mostly geared to the more traditional engineering management topics, such as project management and management for engineers.

The Institute of Technology, which was mentioned above is participating in a two-year programme (Innomat) for the "Development, Piloting and Dissemination of an Innovation Management Training Package". The programme is carried out in cooperation with the Federation of Industrialists. It is a European programme in collaboration with universities and consulting firms from Greece, the Czech Republic and other countries. The aim is to exchange experiences and best practices.

The Institute of Technology is participating in a two year programme (Innomat) for the "Development, Piloting and Dissemination of an Innovation Management Training Package"

Awareness of European and other public support programmes related to innovation management is raised through occasional seminars organised by the Ministry of Commerce and Industry or the Research Promotion Foundation. However, it has been found that only the more sophisticated firms are participating in such seminars. The micro- enterprises (those with less than 20 employees) are rarely amongst the participants.

Extent of adoption of IMTs by local firms

More than 200 local firms from all sectors (manufacturing and services) have already been registered as complying with the quality standard ISO 9000. Out of a total population of 15,000 firms (that is companies of more than 10 employees), this represents a mere 1% of Cypriot firms, although the trend is moving rapidly upwards. The national Cyprus Standards Organisation (CYS) has played a key role both in the education of local firms on the importance and value of quality management and the application of quality standards, but also in the registration and external auditing procedures. The Industrial Employers' Federation and the Chamber of Commerce and Industry have organised several seminars and promoted the importance of the concept of quality among their members. It is important to note that a scheme for the subsidisation of studies for the adoption of standards was introduced through the New Industrial Policy.

Environmental assessment and registration according to ISO 14000 environmental standard is still in its infancy. Only a few firms are registered and four or five other firms are in the early stages of application. Several seminars on environmental standards have been organised, and recently, accreditation and quality assurance of laboratories have also been contemplated.

There are few examples of firms using sophisticated techniques of benchmarking, value analysis or technology evaluation, there is also no initiative yet to train trainers in IMTs or to adapt their skills and know-how to recent technological changes.

Recently, a new scheme was introduced by the Cyprus Tourism Organisation for the combined certification of ISO 9000, ISO 14000 and HACCP (Hazard Analysis and Critical Control Points) addressed to the hotel and catering sector in view of upgrading the tourist infrastructure. The scheme provides for substantial subsidies (up to CYP 8000 or 13840 Euro) for specialised consultancy services and has generated a great deal of interest among hotel owners and operators.

There are few examples of firms using sophisticated techniques of benchmarking, value analysis or technology evaluation, while simple forms of industrial design, project management and management of change are used to some extent. There is also no initiative yet to train trainers in IMTs or to adapt their skills and know-how to recent technological changes.

Discussions with industrialists, consultants and industry experts have shown that, the international exchange of knowledge and methodological practice regarding the use of IMTs, is important. Nevertheless the adaptation of at least some of them to the local business conditions and mentality of managers is a necessary preliminary step, to persuade managers about their value and their eventual adoption.

Adaptation is especially needed to the overall innovation audit (diagnosis) models, which are those that are more urgently needed to place innovation on the strategic agenda of a significant proportion of firms. Once the value of innovation is appreciated the more specialised tools such as value engineering or technology forecasting can gradually be introduced if and when appropriate.

Section 3 - Business innovation interfaces and support measures

3.1 Research community - industry co-operation

The Cypriot R&D infrastructure is dominated by the public sector, which includes institutions such as the University of Cyprus, the Cyprus Institute of Neurology and Genetics (CING), the Agricultural Research Institute (ARI), the Higher Technical Institute (HTI) and the Cyprus Productivity Centre. The private sector is also an important player in the field of tertiary education (see boxed paragraph). There are several institutes, linked to these private sector colleges, which are involved in applied research in social sciences. These will be discussed later in this section, after the review of the public sector institutions. The first three institutions mentioned at the beginning of the paragraph represent the most significant players in the research community of Cyprus. It is worth noting that the government of Cyprus is in the process of setting-up a second University, the University of Applied Sciences and Arts, which should bring together existing research laboratories and institutes of tertiary education, notably the Agricultural Research Institute, the Higher Technical Institute, the School of Nursing, the Higher Hotel Institute, and the Forestry College.

In recent decades, universities in western countries have acquired three complementary roles, which include teaching, research and link to society and industry. The purpose of this section is to mainly explore the third aspect, i.e. the link with industry.

The largest R&D actor in Cyprus is probably the **University of Cyprus**. The total budget of the University of Cyprus was about 14 million Euro for the year 2000, of this, 10 million Euro are contributed by a government grant and 4 million Euro by students fees which are however mostly covered by the government too (all numerical data featured in this section from interview with Dr. Mallouppas and university budget)[5]. The largest part of the

[5] Specifically, fees for undergraduate studies are covered by the government, while post-graduate fees (about 500.000 Euro) have to be paid by the students themselves.

University budget covers salaries. It is interesting to note that the ratio of faculty to administration staff is about one to one, which is probably rather high when compared to other institutions abroad. This may be due, however, to the limited size of the institution.

Several departments of the University of Cyprus have collaborative research projects with various local institutions. For instance, the economics and business departments collaborate with banks (including the Central Bank), the Cyprus Tourism Organisation (CTO) and other government departments. The computer sciences department has collaborations with the CING and the institute of meteorology. There are only a few projects however, that could qualify as "university – industry" links. These include for example a project between the department of chemistry and a local importer of chemicals, work done by the mathematics department in collaboration with a major stockbroker company, or a project on photovoltaic systems involving the physics department, a Cypriot and a French company and funded by the Research Promotion Foundation. Apart from these examples, there are no links between the university and industry or private commercial companies.

About 850.000 Euro of the above mentioned government grant are spent every year on research. This represents 6% of the total budget of the University. This money is used to cover internally funded research projects and to provide academics with smaller funds for travelling to conferences and other routine research activities. Funds originating from external sources (5th Framework Programme, *Leonardo da Vinci*, *Meda*, etc.) amount to approximately 500.000 Euro annually, which represents a mere 3,6% of the total annual budget of the university. It should be noted here, that a new granting scheme funded by the *Leventis Foundation* has been introduced in 2001. The aim is to fund a selected number of projects (5 to 6 projects) up to a total of 175.000 Euro a year. A peer review process, according to established international practices, assesses grant proposals and a funding committee made out of representatives of the *Leventis Foundation* and the university, administrates the scheme. Currently, most of the external funding of the university is attracted by the departments of chemistry and physics where there are about half a dozen projects subsidised by external grants. External funds are also found in other departments of course, such as in the business department which hosts a "centre of excellence" for financial modelling, financed by European Union funds. The university has also launched two new schemes of 17500 Euro each, one covering bilateral schemes between the university and other organisations and the other providing "seed capital" to help academic staff from the university to apply for European funds. The university administrates these schemes itself.

The University has started a process of self-evaluation within the framework of the Association of European Universities also known as CRE. It is hoped that this will help the institution set up a strategic plan for its future development and expansion. Moreover, Cyprus has been participating in the "Bologna conference" on Higher Education and has signed the Bologna convention in May 2001. The convention will enable Cyprus to participate in the European Credit Transfer System while allowing the standardisation of degrees and the implementation of other quality assurances. An indirect outcome of the Bologna agreement will come under the form of a recommendation to the government of Cyprus, to set up a ranking system of university departments of the public and private sector. This will mark a major improvement in the higher education scene in Cyprus, where the University of Cyprus is the only recognised university on the island, and enjoys a *de facto* monopoly in the field of university education, while at the same time, it is not subjected to systematic and stringent processes of external and independent evaluations, except for processes of self-evaluation. In this respect, it is worth mentioning that the university has recently carried out an evaluation of each department. However, until today, it is not clear whether the university will implement the recommendations of the various teams of foreign experts who visited the university departments.

Public versus private tertiary education in Cyprus

At the moment, there are about 2550 students registered at the University of Cyprus while about 7500 Cypriot and foreign students are studying at various private colleges of tertiary education (*Intercollege* is the largest private college with about 3500 students). The colleges, which operate on a profit-making basis, do not receive any subsidies from the government. They offer 2 year Diploma degrees, 4 year Bachelors degrees, and in some cases, Masters' degrees in various academic fields including business studies, information technologies, engineering, law, psychology, journalism, hospitality studies, and other Arts subjects. Sciences subjects such as chemistry, biology and physics are generally not taught. Last year, the government of Cyprus, through its accreditation body, SEKAP, accredited a large number of these degrees. However, despite repeated promises from the Ministry of Education and Culture during the last couple of years and pressing demands on the part of the colleges, the government has failed, so far, to set up a regulatory and legal framework for the upgrade these private colleges to (private) university status. It is hoped that accession to the EU may unlock this situation, because of the forthcoming increased competition in the field of higher education in Cyprus. Indeed, soon, foreign universities will be allowed to establish campuses in Cyprus, and find themselves in direct competition with the University of Cyprus and the private colleges.

Overall, one of the major challenges faced by the University of Cyprus is that its mode of operation "resembles more like a civil service department", than an institution of (competitive) knowledge creation and transfer. For instance, one way to stimulate external funding for research would be to implement a

scheme of "matching funds" whereby each Euro of external funding would be matched by one Euro of internal funding from the university budget. Instead, internal research funds of the university are allocated through internal procedures, which are not necessarily subjected to stringent external peer reviewing processes. The university also adopts a policy of "blanket" allocation of increased research funding to all department heads to compensate for their administrative load, irrespective of peer-reviewed research proposals or research achievements. Another policy, which may not necessarily promote scientific excellence, includes the indiscriminate, non performance-based allocation of a yearly bonus of 5200 Euro and 8650 Euro to all Associate Professors and Full Professors respectively. This discretionary salary bonus was initially meant to attract excellent scientist and academics from abroad and to provide an incentive for research. The scheme has never been implemented for this purpose, and instead, it has been distributed to all entitled faculty, irrespective of academic performance.

Taking all the above into account, it could be argued that the University of Cyprus has not managed so far, to implement the most efficient mechanisms and procedures to promote an environment conducive towards competitive research. Moreover, it may appear that it has also failed to appreciate the importance of attracting significant external research funding and to stimulate its academic staff sufficiently to seek such funding and closer collaboration with industry.

In other European countries, universities have used a variety of policy tools to achieve these aims. These include the setting up of science parks or business incubators within the University campus, a policy of systematic allocation of internal research grants matching external funding obtained by researchers, financial support for the filing of patents, placement schemes for PhD students within industrial companies, setting up of technology transfer units inside the university to spread scientific and technological expertise to industry, stringent independent and external academic evaluation of research output of departments or research group, and finally implementation of financial bonus incentive schemes for researchers to promote excellence in research and the attraction of external funds. Overall, each one of these policies would deserve to be considered in the Cyprus context, if the University of Cyprus wishes to further promote its role of contributing to industry.

Regarding the situation of the **Cyprus Institute of Neurology and Genetics**, the institute has currently no link to industry either. Its budget is about 3,5 million Euro a year. The largest part of the CING budget (about 3 million Euro) is contributed by a government grant to cover costs for services that the institute provides in the field of molecular diagnostics for human genetic

diseases. These services are offered to Cypriot patients admitted in state hospitals. The scientific research activity of the institute is covered by external funds (of a total of about 0,5 million Euro), which include charity fundraising but also research grants from the United Nations, the United States, the UK, France and European Union funds research grants. The charity fundraising activity is based on an annual event ("*Telethon*").

Like the University of Cyprus, the CING suffers from a lack of independent and competitive research funding. It can be pointed out that the CING currently suffers from a further difficulty: Research as a whole is under-funded, and the largest proportion of its junior research staff is relatively underpaid and therefore liable to a fast turnover, which greatly reduces the opportunity for accumulation of human capital and learning. The lack of critical mass of scientists, the inability to attract and keep competitive scientific personnel, all contribute to a gradual impoverishment or erosion of the human and scientific potential of the institute.

Furthermore, to collaborate with industry, the CING would first need to improve substantially its own research potential. For instance, the institute would first need to obtain basic research funding from the government and to set up an appropriate employment structure with clear job descriptions covering all levels of positions for research staff. These (temporary and tenure track positions) would come together with an appropriate salary scales that would enable the CING to attract and maintain qualified staff on a long-term basis. Once such a structure would be in place, and given the right incentive schemes (such as performance related salary bonus), the CING would find it much easier to raise external research funds to a much larger extend than it is the case today, on the basis of international practice. This would also be the key to improved collaboration with industry.

Regarding diagnostics services offered to state hospitals, it could be argued that the government may also gain from creating a more competitive or open market, whereby the state hospitals would be allowed to purchase the same services from private sector laboratories which would be directly in competition with the CING. By operating through the market, rather than through a monopolistic bilateral relation between the CING and the state hospitals, as it is the case today, the CING would be led to improve its competitive edge even further through cost effectiveness and innovation. Although it is generally accepted that the quality of services offered are of high standard, it is suggested that such policy may be conducive to the further development of a wider range of diagnostics offered, and give financial incentives to the CING to create links or new projects with industry, for the creation of diagnostic kits for example. The biotechnology industry is one of the fastest growing industry in

which, however, Cyprus is not active at the moment. The CING could play a role in promoting these new activities if adequate structures of operation were designed and implemented.

The **Agricultural Research Institute** specialises in applied research for the farming community. The institute was established in 1962 as a collaborative project between the Food and Agriculture Organisation and the Cyprus Government. It is staffed with 40 scientists and 72 technicians and over 100 labourers. Its main activities include research in the fields of plant improvement, vegetables, floriculture, fruit trees, viticulture, plant nutrition and irrigation, plant protection, animal production and agro-economic studies. Research work of international interest is published in scientific journals while the institute is also involved in specific information campaigns aimed at the farming community and the agro-business sector. The institute has recently been selected by the Commission as a "Centre of Excellence in Agriculture and Environment" following a call for proposals organised for accession countries. The institute will receive European funding for up to 820.000 Euro during the next three years.

Despite the decreasing contribution of agriculture to GDP, new developments are important, especially in view of the country's need to harmonise with the Common Agricultural Policy. In this context, a great deal of emphasis is placed on the technological advancement and the restructuring of the agricultural sector, to ensure its survival and further growth under the new competitive conditions prevailing in the European Union and resulting from actions taken by the World Trade Organisation. To comply with these new challenges, the Agricultural Research Institute has expanded its scope and incorporated new activities such as the education of future agro-scientists, the provision of services and expert advice locally and abroad, and the development of new research areas such as molecular biology, molecular genetics, toxicology and environmentally friendly integrated crop production methods. It is anticipated that the new University for Applied Sciences and Arts, to which the institute is associated, will facilitate the development of these new activities. Because of the nature of its activities, the Agricultural Research Institute is well placed to develop significant links with industry. Moreover, the agro-industry is a fast growing sector in Cyprus where there is an increased potential for collaboration.

The institute was created in the early 1960s when the majority of employees were hired. Because relatively fewer scientists were hired during the following decades, the institute will have to renew its staff in the near future and redefine its direction at the same time. In concrete terms this means that the institute will gradually need to move away from its "civil service like operation", and instead implement the right incentive structure to promote

internationally competitive research amongst its staff (this may, for instance, include new schemes where promotions are based on scientific merit and where financial bonus can be obtained as a result of successful external funding for research projects). In essence, this will mean that an increasing proportion of the research activity will need to rely on external (competitive) funding. The new department in molecular biology and genetics and the forthcoming external funding within the framework of the "Centre of Excellence" are concrete steps in that direction.

Some of the challenges faced by the Agricultural Research Institute are similar to the ones identified earlier on, for the University of Cyprus and the CING. The described evolution (or revolution?) will require a change of attitude, which can be best initiated with matching policies from the government. Such policies may include changed conditions of employment (away from patterns of non-performance related "life employment"), increased funding for research infrastructure and scientific grants, and improved flexibility of action (including less bureaucratic procedures) for research institutions that will need to compete internationally at an increasingly fast pace. Incidentally, such policies are gathering pace in the rest of Europe, even in the most "rigid and traditional" academic environments, such as in Germany for example[6].

The **Higher Technical Institute (HTI)** was established in 1968 as a joint project of the UNDP and ILO. In 1973, it became the sole responsibility of the Government of Cyprus, operating under the Ministry of Labour and Social Insurance. Its main purpose is to provide training at the higher technician level in Civil, Electrical, Mechanical and Marine Engineering and Computer Science. HTI is also a regional centre for training in the repair and maintenance of medical and hospital equipment.

Research at HTI started in the late seventies through the establishment of the Energy Research Group (ERG). ERG engaged in applied research projects in the field of Energy Conversion and Management, such as solar water heating, solar water distillation, solar space heating and cooling, wind energy conversion, biomass and grape marc digesters, thermal properties of building materials etc. In later years, the HTI developed its activities in new research fields, reflecting the needs of the local industry and the economy in general. These included Computer Aided Engineering (CAD, CAM, FMS), Automation, Robotics, Quality Control, Energy, Industrial Electronics, Electrical Power Conversion, Hydrology, Building and Construction Materials, Environmental Engineering, Earthquake Engineering, Information Technology and Software Engineering. Researchers at the HTI have also been participating in European programmes

[6] "Professors facing power cuts in German university reforms", Nature, Vol. 411, 3 May 2001, p6

such as SAVE, AVICENNE, INCO-DC, MED-CAMPUS, KIT. The range of research activities of the HTI is broad and presents a significant potential for many industrial applications. Co-operation with industry is developing fast in the area of energy saving and solar power applications for the hotel industry.

HTI possesses the necessary infrastructure to further develop its research work in the fields of Industrial Technology, Energy, Biomedical Engineering, Telematics/Telecommunications, and Environmental Engineering. However, the institute is suffering from a lack of funds and it is hoped that its integration within the University of Applied Science and Arts will improve the situation.

Although research funding and effort is rather modest compared to the three institutions discussed earlier (probably because its main goal has always been training rather than research), the HTI has accumulated a considerable experience in working with industry and is therefore extremely well placed to develop further these links.

The analysis of this study so far, has concentrated on "research related" links between industry and academic institutions. It should be noted that **"education related"** links follow roughly the same pattern. Indeed, the interaction of the University of Cyprus and of the CING with the business community regarding training is practically non-existent. The situation of the Agricultural Research Institute is slightly different, because of the nature of its mission, which is to inform and support the farming community. As mentioned earlier, there may also be a potential for further development of relations with the agro-business sector on research- and education related matters. The strongest "industry links" are found at the Higher Technical Institute which has developed an extensive network of industrial training with a series of industries. Industrial Training Officers, available for each specialization, assist students to secure appropriate industrial training places. Industrial training is a major component of work in the last semester of study, as well as during the summer holidays. The HTI has also been hosting short courses and seminars on new technologies (in collaboration with HRDA and various engineering societies) which are attended by professionals from local industry which have attracted over 1800 participants in recent years, and which confirm the role of the HTI as a centre for continuous education. The HTI is also a member of the International Association for Exchange of Students for Technical Experience (IAESTE). Within this framework, Cyprus secures industrial placements abroad for a number of its students during the summer vacation.

In this sub-section regarding "training links with industry" it is also worth mentioning the activities of the **Cyprus Productivity Centre**, which comprise four distinct components: Management

Development, Public Administration, Mediterranean Institute of Management (MIM) and Vocational Training. The MIM organizes each year a post-graduate management diploma and a short international seminar in the fields of labour administration and small enterprise development. The Management Development programme offers training to private sector firms in the areas of management, consultancy, information, and surveys. The Public Administration component offers various training programmes to the public administration and the Vocational Training programme deals with vocational training programmes on technical matters and services for the promotion of new technology in industry. These include training sessions on programmable logic controllers, hydraulics, pneumatics, machine tool turning, fitting, etc.

The existence of the **Cyprus Academy of Public Administration** should also be mentioned here. The institute continues to focus its activities on the training needs of civil servants with regards to EU institutions, structures, policies and legal framework.

It is also interesting to note that the **Private Colleges of Tertiary Education** often have stronger links with industry than the University of Cyprus or the CING. This is not surprising, given that applied research of socio-economic nature is carried out at most private colleges[7], because of the financial income this can yield, both directly and indirectly, through public exposure and added publicity for the colleges. Typically, this research includes business feasibility studies, surveys and polls, market studies, business strategy analyses and other consultancy projects. However, the main pillar of the relation between the colleges and the business community is "education related", and comes in the form of professional training activities which are specifically targeted to the needs of businesses, especially SMEs. As mentioned earlier in this report, the training subsidy provided by the HRDA has been instrumental in forging these links.

[7] Mainly *Americanos College* (www.american.ac.cy), *Cyprus College* (www.cycollege.ac.cy), *Cyprus International Institute of Management* (www.ciim.ac.cy), *Frederick Institute of Technology* (www.frederick.ac.cy), and *Intercollege* (www.intercollege.ac.cy).

Private sector research

One private college deserves a special mention, because it is involved in applied scientific research, in addition to the "traditional applied social sciences" areas of activity described in the previous paragraph. This is the case of the *Frederick Institute of Technology* which hosts a research centre ("The Frederick Research Centre") specialised in the fields of technology (materials, manufacturing and processing, energy, construction, transformation and information technology) and sustainable development. Research is funded through internal grants of the college and external grants from the (Cyprus) Research Promotion Foundation and the European Commission, but links to industry are relatively limited.

Other private sector initiatives include a small private engineering research centre working in the field of water conservation and earthquake resistant building structures ("Koronida", www.koronida.com.cy.).

It is worth noting that one of the colleges, *Intercollege*, is engaged in a policy of strengthening links between academia and industry through the development of a centre for applied research and a business incubator, as detailed in the next section.

Overall, the evidence collected so far, points out that Cyprus is lagging behind in the field of "research-industry" collaboration. Cyprus's weakness in this field can of course be explained in the first place by the atrophy of its own research infrastructure. Having said this, it seems that the countries' authorities, have not yet paid sufficient attention, to the policies that would help reverse this situation[8]. The extremely low percentage of GDP spent on R&D (0.36%) needs to be raised dramatically and a critical mass of scientists and research institutions needs to be created. This move has to go hand in hand with a policy that would enforce and guarantee that the increased capital spent on R&D would be allocated to researchers and institutions on an internationally competitive basis. More (government) money should go to better laboratories (i.e. those laboratories that have also proved capable of obtaining funds from abroad), and there is a need for a level playing field to ensure that healthy competition exists between institutions at home and abroad, and between the private and public sector. Anything less would mean a waste of public funds and a long term failure to upgrade the R&D resources in Cyprus.

[8] The continuous development during the last four years of the Research Promotion Foundation is a step in the right direction. However, there is still a long way before the country achieves to host a research infrastructure comparable to most European countries.

Sources

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Own observations and data gathering

3.2 Support for start-ups and new technology based firms

Incubators

The only existing scheme of support for start-ups and new, technology-based firms is the newly introduced government programme for High Tech Business Incubators, which is part of the New Industrial Policy, adopted by the Ministry of Commerce, Industry and Tourism[9]. The government programme for High Tech Business Incubators aims to address some of the structural deficiencies of the manufacturing sector in Cyprus. The purpose is to encourage entrepreneurial activities with higher value added in order to enhance the overall competitiveness of economy. The programme is based on recommendations from an *ad hoc* Technical Committee, which studied the establishment and development of business incubators in Ireland, Israel, Greece and the United States.

Two companies have been selected to become active incubators and assist the government in the implementation of its incubator policy: *Proplan Ltd* specialised in environmental consultancy and the *Cyber-Group Ltd* specialised in information technologies. These companies will have to create the necessary physical infrastructure by either building or renting the incubator premises, they will have

[9] Loan guarantees and subsidised interest rates, as mentioned earlier in this report, also contribute to offer start-up support to SMEs.

to secure the necessary equipment, hire a minimum support staff, and provide relevant services to the companies interested in participating in the scheme. It will be up to the incubator to identify and select potential candidates (inventors mainly) to participate in the scheme. The incubators are supposed to assess the various candidate applications from a scientific and commercial point of view, help the inventors preparing a business plan, find partners for the commercial and/or scientific part of the project (including patent search), and also help inventors to find financial partners that may bring additional capital into the venture. Once all this has been achieved, an application for funding will be submitted to the government. The government will set up a committee to assess the application, and if approved, a contract will be drafted and signed between the government and the inventor. The active partners (incubator and inventor) will then create the company that will be responsible to develop the new product.

The incubators themselves will be receiving some money from the government for their expenses. In view of the current interest in the measure, the Council of Ministers intends to issue another call for proposal in 2001, to set up more incubators. The idea is to at least achieve the initially envisaged number of four incubators. It is also hoped that proposals will come from other sectors than software development. Regarding the operation of incubators, it is interesting to note that applications are accepted from individuals rather than companies. Considering the way incubators operate in other countries (for example in the Czech Republic or Israel), Cyprus adopted this model to encourage individuals who have a particular know how to come forward with their creative capabilities. Besides, incubators will provide premises, equipment, advisory services and assistance in setting up a company, which existing companies may not need.

In addition to the general interest in the newly established incubator scheme, there is currently also an interest in the creation of a technology park in Limassol by the Chamber of Commerce, the financial institution *Sharelink* and the *Hellenic Bank*. This falls exactly within the scope of the New Industrial Policy, and the government intends to make land available to support this initiative.

It is too early to evaluate the result of the incubator initiative, but information gathered so far indicates that the policy has not yet yielded the positive results that were initially expected. At the time this report goes to press, the government had selected two incubators (the *Cyber-Group Ltd* and *Proplan Ltd*) to host future high tech companies, but for different reasons none of the two incubators are currently operating. These reasons include the level and quality of the applications of would-be entrepreneurs and the availability of private sector capital to support the venture. A

closer follow-up of this policy scheme in the next months will tell us whether it may have perhaps been too ambitious to want to develop a high tech sector in an environment where science and technology activities are largely underdeveloped (we can recall here the percentage of GDP spent on R&D is about 0.36%, which is 10 times less than the European average).

Apart from the business start-ups within the incubator policy framework, there is no systematic monitoring of new entrepreneurial activities, through studies and surveys; and therefore it is very difficult to draw meaningful conclusions as to the current trend in new business start-ups in the high tech sector.

However, through interviews with a number of key entrepreneurs in the financial sector, there is sufficient evidence to show that venture capitalists are also focussing their attention on high tech initiatives, including the creation of a limited number of private business incubators, which are now under study. It is worth mentioning that one venture capitalist clearly identified the lack of research infrastructure (in applied and basic research) as an additional element of risk in the creation of high tech business start-ups. The lack of policy initiatives, such as incentive schemes to encourage investments in new high tech start-ups, offers additional support to this view.

Table 6 - Main Initiatives taken in favour of Start-Ups

Organisations responsible	Objectives	Target Public	Funding
Government through the Ministry of Commerce, Industry and Tourism	High tech business incubators, to be undertaken by private entrepreneurs	High tech start-ups	C£ 100 000 per start-up, **plus** about 60% operational expenses of the incubator **plus** private investments
Demokritos High Tech Group Ltd **(www.demokritosgroup.com)**	Private business incubator	High tech start-ups	Private venture capital

The Applied Research Centre of Intercollege

Intercollege, which is the largest private institution of tertiary education in Cyprus, has addressed the issue of new business start-ups, through a newly developed policy for strengthening links between academia and industry. It has already started a programme of applied research and also plans to create a high tech business incubator within the framework of the New Industrial Policy described earlier in this report. The purpose of the Applied Research Centre is to develop ideas for new, innovative and technologically sound products, into prototypes. The business incubator shall be designed to host 10-15 new start-ups. Management and technical support will be provided to the start-up companies, until these will be able to fend for themselves and secure outside financial support in order to bring their products to the market.

Similar developments also characterise the situation at other major private colleges of tertiary education in Cyprus.

3.3 Business networks for innovation

Currently, there are no initiatives for business network creation in Cyprus. However, some attempts have been made in the past to set up such schemes, especially in the context of the UNDP and UNIDO Cyprus Industrial Strategy study carried out between 1987 and 1989 by a team of industrial policy experts from the Institute of Development Studies at the University of Sussex, Brighton, UK (IDS 1987, Murray 1992). The report argued for the re-direction of the existing industrial strategy along the path of the new "flexible specialisation" paradigm. Among the proposed measures, were policy suggestions to reinforce the collaboration between firms. The government of Cyprus has never really implemented the proposed strategy with the exception of a few items such as the creation of the Institute of Fashion referred to earlier in this report.

One legacy of UNDP/UNIDO study was the creation of the "A to Z" furniture consortium which also received considerable support from the Cyprus Development Bank during its foundation. With the support of the Cyprus Development Bank, a group of about 13 furniture makers agreed to open a joint retail shop, for which they would produce newly designed products on a specialised basis (one firm would be specialised in kitchen furniture, another in children's furniture etc.). The members of the consortium were allowed to keep their own retail shops and their lines of production, but the specialised furniture could only be sold in the joint shop. The system provided for immediate economies: firstly the unit costs in the specialised furniture fell dramatically as the result of longer runs and the new lines allowed manufacturer to invest in new lines and larger facilities. Secondly, the consortium offered clear retail economies including the services of a specialist interior designer, a wider variety of

products on offer (economies of scope), the availability of dedicated marketing staff in charge of new product development, the establishment of a joint delivery system and greater advertising possibilities. It became evident soon, that these economies could be extended back into production and purchasing. The results of the exercise have been strikingly successful and the consortium has opened several shops in major towns in Cyprus. After more than 12 years of existence, the venture still exists today.

The above example as well as some others that were later set up for similar purposes (e.g. *Line 11* furniture company) illustrate that the creation of business networks in Cyprus constitutes a policy option that should not be disregarded. One of the problems however, is the lack of geographical and industrial concentration on the island. There are no clusters of firms, mainly perhaps because no industrial sector is sufficiently important to constitute a minimum critical mass of specialised firms. Having said this, new forms of virtual networks of firms would be worth investigating in the Cypriot context. Other possibilities also include a closer look at service-based industrial branches, which are rapidly gaining importance in Cyprus, at the expense of manufacturing industry.

Conclusion

In its annual report on Cyprus (Moody's 2001), *Moody's Investors Services* underlined the improved fiscal situation in Cyprus and the positive effect of Cyprus's likely participation in the next wave of EU enlargement. However, on the negative side, a lack of economic diversification and other structural deficiencies are still underlined. These shortcomings include an over dependence on tourism for foreign exchange revenue, labour market rigidities that have led to protracted competitiveness problems, and a banking system made more vulnerable due to the recent stock collapse and insufficient market orientation. In spite of widespread support across the country's political spectrum for joining the EU, a divisive legislative environment has consistently delayed passage of sweeping structural reforms that are needed for admission, especially regarding financial and capital market liberalisation, as well as tax code restructuring. Having said this, gradual advances are now being implemented, supported by a narrowing fiscal deficit over the past three years, thanks to both revenue gains and spending restraint. All these changes comply with EU membership requirements and contribute to improving the market orientation and the competitiveness of the local economy.

The longstanding "Cyprus problem", the division of the island following the Turkish invasion in 1974, has produced lingering political and economic costs, especially in the defence sector. Even as negotiations have failed to produce a resolution, the division of the island no longer generates violence nor discourages tourism or investment by foreigners. Although the process of European accession is far from being concluded, it is expected that Cyprus will eventually join the Union with the first wave of applicants.

The state of play of the Cyprus economy may be seen as somewhat paradoxical: a dynamic economy engaged in a path of sustained growth during the last two decades, combined with rather weak policy implementation mechanisms[10], structural rigidities, and a seriously underdeveloped R&D infrastructure, which both, impend the long term competitiveness of the economy.

[10] "While there is broad agreement on the main objectives of economic policy, recently there have been significant difficulties in implementing the necessary measures to achieve those objectives. Many indispensable economic reforms suffer from excessive delays and when they are enacted, they are often burdened with additional conditionality to moderate the effects. In some cases, most notably with the recent increase of VAT rates, this additional conditionality has proved to be counterproductive" (European Commission 2000, p26).

Structural deficiencies and rigidities

"Government policy and legislation have provided a sheltered environment for the growth and development of the private sector. Nonetheless, Cyprus has also adopted a protectionist and interventionist approach to industrial policy, which has favoured domestic producers at the expense of foreign competitors. The semi-public sector is extensive, and often protected by legal monopolies".

"… competitiveness is hampered by a number of structural rigidities which protect domestic enterprises. Cyprus must prepare its private sector to operate in the open environment that integration in the EU requires. Greater political consensus is needed to develop a comprehensive structural reform agenda, which will address rigidities. There is also a need to limit the extent of both implicit and explicit state involvement in economic activities, open up key sector to foreign competition, and resolve important environmental constraints. The influence of the state in the economy needs to be reduced through the divesting of its assets in private enterprises, the further reduction of direct and indirect state aids and the introduction of more competition in a number of key sector" (European Commission 2000, p31-32).

Having said this, it is clear that the accession procedure has been instrumental in bringing forward a series of – long overdue – and far-reaching changes in the Cypriot economy. Still, the road to "harmonisation in substance" (as opposed to the formal process of harmonisation from a strictly legalistic point of view) will be a long one. In the remainder of this conclusion, some of the issues, which should deserve further attention and progress, are analysed.

- There is little FDI in Cyprus and therefore, an important potential for development in this field, exists. FDI could bring the much-needed injection of R&D, but above all, contribute to change, what one could call the "mentality of a sheltered island economy", which has been prevailing for the last decades in Cyprus. This should help a process of progressive openness of the economy and increased exposure to globalisation.

- There is no public debate about innovation in Cyprus. In fact there is confusion as to what innovation actually means, and there is the usual misconception that innovation equals technology. This study, which is the second[11] in the field, should contribute to stimulate a public debate on the relevance of innovation policy for Cyprus. A first step in this direction has been set with the organisation of a workshop on innovation policies in Cyprus, as part of the process of preparing this study.

- The small "island economy" of Cyprus has gone through a

[11] The other study referred to here is PricewaterhouseCoopers (1999).

rapid development process during the last thirty years, by-passing some essential milestones such as the creation of a mature and competitive manufacturing base and the establishment of a meaningful research and technology infrastructure. For this reason, the country never developed high technology-based industrial activities. Cyprus has to progress in the development of a basic research infrastructure (in science and technology) and the subsequent promotion of technology transfer schemes and innovation schemes (such as the development of collective "facility centers" as discussed during the National Innovation Policy workshop). In concrete terms, a first step would be to implement without delay all the provisions of the New Industrial Policy. This should also include the creation of the Centre for Technology, Research and Development, which probably constitutes one of the most important pillars of the New Industrial Policy[12].

- There is a lack of risk- and venture capital for medium-term investments. The prevailing culture in the business community is very much influenced by a short-term approach to investment.

- Regarding the development of incentives for R&D, the government may want to consider introducing tax relief for R&D investments. However, this should be compatible with the spirit of the forthcoming (and long overdue) overall tax reform in Cyprus[13]. If a simplification of the taxation system is enforced (and this is the most likely scenario), other R&D promotion instruments may well be more appropriate.

- As discussed extensively earlier in this report, schemes of vocational training should be improved to support the needs of the New Economy. The labour market suffers from serious rigidities and there is an urgent need to develop new ways to adapt to the changing economic environment. This is not an easy task since the nature of labour demand in a small market like Cyprus, is relatively volatile.

- IMT awareness is virtually non-existent. Everything needs to be done in that field. The same applies to clustering and inter-firm collaboration. Both shortcomings may be linked to the fact that the dominant model of firm in Cyprus, is the traditional small family company, whereby firms often consider each other with mistrust. Both issues need to be

[12] Having said this, as mentioned in the Commission's Regular Report on Progress Towards Accession (European Commission, 2000, p67), "No clear progress has been recorded on the creation of the Centre for Technology, Research and Development".

[13] There is an urgent need for a substantial review of Cyprus's taxation system both in view of the harmonisation process with the EU but also because of the OECD requirements regarding the Cyprus off-shore sector and its compliance with "non-harmful taxation" procedures.

addressed with awareness campaigns geared at "conventional" firms to highlight the potential benefits of increased co-operation between firms and other (professional) management issues.

- Academic research is not geared towards problem solving services to the Cypriot industry and research-to-industry links are virtually non-existent. However, before improvements can be achieved in this field, the whole research infrastructure, both public and private, needs to be restructured and strengthened, so as to be able to operate along the lines of a truly internationally competitive academic environment. This means that all research activities must be subjected to the stringent process of (international) peer review and competition. Cyprus will not be able to set up a meaningful research infrastructure, if it continues to under-fund research and to "shelter" its own researchers from international competition by means of self-evaluation, or by avoiding to implement performance-related incentive schemes. The responsibility lies with both the research community and the government: the latter needs to invest heavily in new infrastructure and research funding, the former needs to compete in the "real world" and to accept the possible benefits and drawbacks of their performance.

- Regarding the main innovation supporting pillar of the New Industrial Policy, namely the incubator policy, it is too early to conclude about possible results at this stage. In fact, it seems that observers are divided on the issue and it appears that the scheme is suffering from delays (mainly regarding the financial contribution –equity- which represents the incubator's own contribution), but possibly also from a lack of sufficient good applications. Observes also point out that "ready made solutions from abroad" may not be capable to deliver the expected results. The island's economy suffers from a serious handicap in terms of R&D infrastructure and policy. While this needs to be addressed urgently, it may also be true that wanting to attract *per se* foreign high tech companies is not a *panacea*. The promotion of local technologically driven industrial activities calls for a well-balanced, sophisticated and long-term policy involving a wide range of actors. In short, a sharp burst of government inspired technological investment is unlikely to sustain significant new growth in the short run and may not bring about the expected long-term positive impact on the local economy (Musyck 1999).

The forthcoming RIS Cyprus (Regional Innovation Strategy) project (which should be starting after September 2001) may well deliver the much-needed "software" or "institutional thickness" which is crucially missing in Cyprus. However, this should come

together with a serious commitment on the part of the government to invest substantial funds in the research infrastructure of the country ("hardware").

A RIS project is above all an exercise of social engineering in search of local consensus building between the various stakeholders of the local economy (Musyck & Reid 2000). The establishment of a renewed consensus could in itself be a novelty in Cyprus, where most social partners remain entrenched in their traditional position[14], not realising that collaborative actions, and not confrontational ones, can engender a collective process of learning and innovation based on the expertise and dynamism of a large number of stakeholders. There may be promising results if Cyprus decides to adopt an innovation strategy. However, this process should be on going and ensure that politically stable and credible governance structures are put into place supported by professional competence and awareness in the field of innovation. Setting up a RIS project is a sophisticated and complex endeavour and it may well be that traditional policy makers and administrators would rather favour "traditional" and "easy to manage" policy instruments.

The renewed policy agenda for innovation in Cyprus must ensure that the development of the regional innovation system will not fall in the hands of consolidated lobbies and party political considerations that hinder innovation. The risk of doing "too little too late" is always looming; therefore Cyprus needs to use new mechanisms to design and implement policies in the field of innovation in a timely fashion.

[14] This issue has become particularly relevant in recent years when the government had to face the stiff opposition of various workers' unions and some political parties, in its efforts to liberalise large segments of the economy and to press ahead plans for deregulation and privatisation. In sensitive fields such as telecommunication and air transportation, public monopolies are in urgent need of restructuring if the process of European integration is to be followed smoothly.

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