A PRELIMINARY STRATEGY TO
DEVELOP A KNOWLEDGE ECONOMY IN
EUROPEAN UNION ACCESSION COUNTRIES

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A PRELIMINARY STRATEGY TO DEVELOP A KNOWLEDGE ECONOMY IN EUROPEAN UNION ACCESSION COUNTRIES*

PREFACE

This report discusses the implications for the EU Accession countries* of the global revolution in knowledge, and of the development of knowledge economies in the most advanced industrial countries. It provides a very preliminary strategy for the countries to follow in developing knowledge economies, and a preliminary strategy for the World Bank to assist them in this process.

A country’s ability to benefit from the knowledge revolution was studied by the World Bank in its 1998 World Development Report *Knowledge for Development*, and by the OECD. The basic idea is that knowledge is a factor of production, along with capital, labor, land, and other factors in determining economic growth. Globalization and new technologies are creating new opportunities for growth. Information and Communications technology speeds up access and return to this knowledge. The result is improved product quality, reduced cost, better product adaptation to consumer needs, as well as totally new products. The most advanced economies are characterized by leadership in this process. On the downside, there is also an increasing digital, scientific and technological divide between the more developed countries that are exploiting knowledge, science and technology for economic well being; compared to less developed countries and to less developed regions within countries, that are not adequately participating in this revolution, and in the poorest countries not participating at all. The challenge is to find ways to remove the constraints to such participation.

There are four critical requisites for a country to be able to fully participate in the global knowledge economy:

(a) A regulatory and economic environment that enables the free flow of knowledge, investment in Information and Communications Technology (ICT), and encourage entrepreneurship;

(b) An educated and skilled population to create, share and use knowledge;

(c) A dynamic information infrastructure ranging from radio to the internet, in order to facilitate the effective communication, dissemination and processing of information;

* The report only deals with the ten Central European EU Accession candidate countries, including Estonia, Latvia, Lithuania, Poland, Hungary, Czech Republic, Bulgaria, Armenia, Slovenia and Slovakia. It does not discuss Turkey, Malta and Cyprus, which are different cases, with different constraints and opportunities. When the text refers to EU Accession Countries, it does not include these last three.
(d) A network of research centers, universities, think tanks, private enterprises and community groups to tap into the growing stock of global knowledge, assimilate and adapt it to local needs, and create new knowledge.

This report briefly discusses the situation found in the EU accession countries with respect to the above four pillars. It proposes further work to analyze this situation at the country level. Based on future country level strategies, it proposes a set of investment programs and policy/regulatory reform needed so that the countries can participate more actively in the global knowledge economy. This is done in an already improving situation, in which governments in each of the countries have become aware of the importance of development of innovation systems, education reform, ICT development, and the need for improved economic policy.
ACKNOWLEDGEMENTS

This report is based on the pioneering work of Carl Dahlman and his team at the World Bank Institute. Special thanks to Ms. Vivien Gyuris who undertook valuable background research and who provided valuable input. It was prepared at the suggestion of Mr. Johannes Linn, Vice President Europe and Central Asia Region. Most of the World Bank European and Central Asia management team provided relevant suggestions with several key thoughts and inputs provided by Messrs. J. Linn, M. Selowsky, S. Katsu, S. Kodderitzsch F. Kaps, Michael Carter, Aron Goldstein, Jeffrey Balkind, Margaret Thalwitz, A. Vorkink, R. Grawe, Carol Reed, Devrin Weiss and Angela Griffin. Messrs. Jean-Francois Rischard and Elkyn Chaparro provided useful comments. Comments have also come from some country clients and staff in donor agencies who received an earlier draft. An earlier draft of the report was used as a basic reference text for a workshop on this subject, held at the World Bank in July 2001. Material and comments from the workshop have been used to update this report.
A PRELIMINARY STRATEGY TO DEVELOP A KNOWLEDGE ECONOMY IN EUROPEAN UNION ACCESSION COUNTRIES

I. INTRODUCTION

1. The EU accession countries focused for the past ten years on an economic policy agenda of transformation from command to market based economies. Top priorities were privatization, creation of an efficient market oriented banking system, de-collectivization of farming, reform of government administration, establishment of a legal and judicial system necessary to manage a market based economy, creation of market institutions, maintenance of a social safety net, and establishment of an economic policy environment attractive to investors, savors and consumers. Much of this agenda has been achieved, though to varying extents, among the ten candidate countries. The next major challenge which has arisen is for these economies to tap into and participate more in the global knowledge economy, which is the major motor of economic growth in OECD countries, and can be the major source of growth for the EU accession countries. Successful exploitation of global knowledge in all sectors of economic, social, and environmental endeavor can also help the candidate countries enter the European Union and contribute to meeting the challenge of the Lisbon 2000 EU Summit which set the objective of making the European Union the most competitive economy by the year 2010.

2. What is knowledge economy? Because of the increased attention to the gap between the OECD countries and low and middle income countries in their use of information and technology and the digital divide, use of computers and the Internet have become the most publicized components of the knowledge economy. Several EU accession countries have already begun interesting electronic government and electronic commerce initiatives. All have plans to develop at least this aspect of the knowledge economy (Information Society Initiatives, under the umbrella of the European Commission’s e-Europe 2003 action plan). However, there are many other dimensions of how an economy and society will exploit knowledge in the 21st century. Knowledge is a factor of production, along with capital, labor, land, and other factors in determining economic growth. Many economists now argue that it has become the most important factor of production. Globalization and new technologies are creating new opportunities for growth. Information and Communications technology speeds up access and return to knowledge. Continuous technological improvements now characterize nearly every product produced by man. The result is improved quality, reduced cost, better adaptation to consumer needs, as well as totally new products. On the downside, there is also an increasing digital, scientific and technological divide between the more developed countries that are

* Excluding Turkey, Cyprus and Malta

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1 This is not new. Solow in 1957 found that in the United States in 1906-1949 gross output per man hour doubled, with 87.5% of the increase attributable to technical change, and only 12.5% due to increased use of capital (from Marcelo Selowsky, World Bank, June 2001).

exploiting knowledge, science and technology for economic well being; compared to less
developed countries and to less developed regions within countries, that are not adequately
participating in this revolution. The challenge is to find ways to remove the constraints to such
participation by developing countries, middle income countries (such as the EU Accession
countries) and by less developed regions within countries.

3. For the EU accession countries, the constraints are much less onerous than for the
developing world. A well trained labor force, considerable experience and capacity in science
and technology, relatively well developed communications facilities, and an increasing openness
to foreign technology and enterprise, make the EU accession countries fertile ground for
participation in the global knowledge economy. These countries will need to compete more
effectively with more developed knowledge economies when joining to the European Union. It
is therefore in this group of countries that the World has begun a knowledge economy initiative
in the Europe and Central Asia Region. This report suggests what a broad strategy to develop
the knowledge economy for the EU accession countries might look like, and then suggests a
concrete program to assist interested country representatives to develop national knowledge
economy strategies. This is done in the context of considerable progress made by some EU
accession countries in some knowledge economy areas. The proposal is based on similar
successful efforts by the Bank in South Korea, China, Brazil and India, and on the results of
consultations with interested officials and citizens in the accession countries, in the European
Commission, in the OECD, EBRD, EIB, and with key NGOs. An earlier draft of the report was
shared with key partners within the EU accession countries and these partner agencies.
Responses to earlier drafts have been used to modify this report. The next step is to help further
develop country knowledge economy strategies. A regional strategy can only provide broad
directions. The real action plans must largely be at the country level. The full process is fleshed
out below.

II. THE KNOWLEDGE ECONOMY FRAMEWORK FOR
DEVELOPMENT

4. A country’s or community’s ability to benefit from the knowledge revolution was studied
comprehensively by the Bank in its 1998 World Development Report Knowledge for
Development, and more recently by the OECD. The World Bank Institute subsequently
developed a framework for analyzing the various policies and institutions required to develop a
knowledge economy. It found that there are four critical requisites for a country to be able to
fully participate:

3 Many countries of the former Soviet Union also have potential to develop a knowledge economy, because they
also have experience and capacity in science and technology, as well as adequate communications facilities. The
constraints however are more numerous. Knowledge economy work in the former Soviet Union (outside the
Baltics) needs a somewhat different strategy that is being developed separately.

4 The OECD has published widely on these subjects. See OECD, Science, Technology and Industry Scorecard,
Project.” OECD, 2000, Paris, France. See the OECD Website for material. The World Bank Institute’s most recent
production on this subject is for China: World Bank Institute, 2001, China and the Knowledge Economy, Seizing
the 21st Century, by Carl J. Dahlman and Jean-Eric Aubert, World Bank, Washington, D.C.
(a) An institutional and economic environment that enables the free flow of knowledge, investment in Information and Communications Technology (ICT), and encourages entrepreneurship;

(b) An educated and skilled population to create, share and use knowledge;

(c) A dynamic information infrastructure ranging from radio to the internet, in order to facilitate the effective communication, dissemination and processing of information;

(d) A network of research centers, universities, think tanks, private enterprises and community groups to tap into the growing stock of global knowledge, assimilate and adapt it to local needs, and create new knowledge.

5. The demand side is as important as the supply side in developing a knowledge economy. Knowledge for development is mostly, though not exclusively, used by the private sector. The private sector is likely to demand new knowledge as well as to supply it when the investment climate is good, when the economy is growing and new market opportunities are opening up, and when the profitability of investment is high. All of the traditional macro-economic prerequisites of growth are therefore also prerequisites for private individuals and firms to demand new knowledge. Demand and supply of knowledge for the private sector spills over to societal demand for public sector knowledge. Societies which share knowledge on science and technology tend, over time, to insist on greater government transparency and better government service as well.

6. A broadly similar conceptual framework is proposed in The Global Competitiveness Report, 2001-2002 completed for the World Economic Forum. The focus of this report is economic competitiveness. The thesis is that “the evolution from middle income to high economic status involves the transition from a technology importing economy to a technology generating economy, one that innovates in at least some sectors of the global technological frontier.” The report states that the challenge of many middle income countries is to attract high flows of foreign direct investment, which brings new products, new technologies, new markets and capital. To move out of middle income status is a difficult jump, requiring high rates of innovation and commercialization of new technologies. To achieve this requires good economic policy, good governance, social capacity to improve its technological capacity, institutional changes, higher education, R&D, improved capital markets, and regulatory systems.

7. Many of the EU accession countries are in the process of transitioning from middle income country to innovation-based development. The report recognizes that the policy and institutional reform requirements of this transition are extremely difficult, in part because the ingredients for success in an innovation-based high income economy are different than the ingredients for moving into middle income status.


6 The Global competitiveness Report, op. cit.
8. The OECD also finds in its analysis of growth that the importance of ICT development, innovation and technological development, higher skills in the labor force, and good policy is critical. OECD has emphasized the importance of policy in creating an enabling framework for entrepreneurship. Emphasis is given to policy encouragement to competition, and creation of conditions for an efficient labor market.

III. THE KNOWLEDGE ENVIRONMENT IN EU ACCESSION COUNTRIES

9. The World Bank Institute (WBI) and the World Bank’s World Development Report of 1998, measured some of the key considerations that will be at the center of country knowledge assessments and strategies (see Web site: http://www1.worldbank.org/gdn-scripts/programs/kam/kamscript.exe/show_page.) The charts below provide data from WBI illustrating the degree of integration of EU accession countries into the global knowledge economy. This data has been summarized for presentation purposes into the spider-web charts below. The charts provide indicators of a country’s integration into the knowledge economy. Computers per 1000 people, telephones per 1000 people, tertiary school enrollment, adult literacy, and high technology products as a % of manufactured exports are examples of the indicators shown. The outer circle of each chart represents a perfect score on all indicators. To the extent that the situation of a country is reflected in an observation closer to the central point of the circle, it is weaker. The first and second charts immediately below are for China and India. These are shown for comparison. They are followed by a chart representing the average for all transition economies, and a chart showing the average for the Group of 7 most advanced economies, followed by charts for Estonia, Latvia, Lithuania, Poland, Hungary, Czech Republic, Bulgaria, Romania, Slovenia and Slovakia.

10. According to this data, many EU accession countries do well on adult literacy and telephones, but all do much less well on the other indicators compared to the G-7. Particularly weak in all accession countries is expenditure on R&D. The percentage of high-technology products in manufactured exports, enrollment in tertiary education (past high school), computer availability and internet hosts are also relatively weak in all EU accession countries compared to most of the G-7.

7 OECD op. cit.
KNOWLEDGE SCORE CARDS

China

India
Hungary

- Average Annual GDP growth 1990-98 (%)(2000 VDI)
- Internet hosts per 10,000 people, July 1999, 2000 VDI (in ln)
- Tariff & nontariff barriers (2001 Heritage Fdn)
- Rule of Law (WB)
- Tertiary enrollment 1997 (2000 VDI)
- Control of Corruption (WB)
- Secondary Enrollment 1997 (2000 VDI)
- FDI as % of GDP 1990-1998 (SIMA)
- Total expenditure for R&D as % of GNP, 1987-1997 (2000 VDI)
- High-Technology products as % of manufactured exports, 1998 (2000 VDI)

Czech Republic

- Average Annual GDP growth 1990-98 (%)(2000 VDI)
- Internet hosts per 10,000 people, July 1999, 2000 VDI (in ln)
- Tariff & nontariff barriers (2001 Heritage Fdn)
- Rule of Law (WB)
- Tertiary enrollment 1997 (2000 VDI)
- Control of Corruption (WB)
- Secondary Enrollment 1997 (2000 VDI)
- FDI as % of GDP 1990-1998 (SIMA)
- Total expenditure for R&D as % of GNP, 1987-1997 (2000 VDI)
- High-Technology products as % of manufactured exports, 1998 (2000 VDI)
A different methodology for ranking countries on “competitiveness” was developed in the Global Competitiveness Report done for the World Economic Forum. They developed several indices representing the underlying prospects for growth in the next 5 years for 75 economies, including several EU accession countries. The data are based on surveys of businessmen in the 75 economies ranked. One index labeled the “growth competitiveness index” shows the top performers to be the OECD countries, but include Singapore, Taiwan, Hong Kong, and Korea in the top 25. Hungary is rated as the most competitive Eastern European economy (ranked 28) followed closely by Estonia (29) and Slovenia (31). Romania and Bulgaria are ranked in the 50’s, with other accession countries in between. The article indicates that to reach the “innovation-driven” stage of economic development, “companies must innovate at the world technology frontier, develop unique product designs, sell globally, and create more decentralized and flexible organizational structures.” The recommendations are consistent with the World Bank’s conceptual framework first introduced in its 1998 World Development Report previously cited, and in the current work at the World Bank Institute and OECD, even though the country rankings differ due to the different emphasis on constituent parts of the index.

OECD has also developed a set of measures which are aggregated and provide rankings of knowledge base in the economy. The OECD rankings are similar to those of the Global Competitiveness Study, with differences explainable by definitions involved in the index, and the timing of data collection. The OECD shows Sweden, the United States, Korea and Finland to be the four most Knowledge based economies. This most recent report focuses more on ICT as a dynamic element. Importance is given to education, expenditure on R&D, venture capital to finance innovation, and international cooperation in science. Some EU accession countries, such as Hungary, are ranked higher on the OECD indexes than in both World Bank Institute data and in the Global Competitive Study.

Macroeconomic Policy, Incentives, and the Regulatory Environment Needed to Support the Knowledge Economy

Basic Macroeconomic Stability and an appropriate regulatory environment is a prerequisite for a country to participate fully in the global knowledge economy. Industrial development based on technology deepening and knowledge can be hampered or precluded by chronic inflation, fiscal and monetary crises, repeated “boom and bust” cycles, or insufficient national savings and investment. The Bank’s 1998 World Development Report on knowledge found that low inflation, good fiscal and monetary policy, and an appropriate regulatory environment for both business investment and technology transfer are prerequisites for a knowledge economy to develop. The conditions required do not differ from those generally advocated by the World Bank, the IMF, the European Commission and the OECD as the most propitious for long-term economic growth. Some countries, such as Israel and Brazil, have achieved significant growth in technological capabilities within high-inflation environments. However, most observers agree that significantly greater progress could have been made under more favorable macroeconomic circumstances.

Global Competitiveness Report, op. cit.

Of interest is the fact that Finland ranks first, the U.S. second, and Canada third.

14. Many EU accession countries have a macroeconomic policy and regulatory environment which is increasingly consistent with these requirements.\(^{11}\) According to the Global Competitiveness Report’s macroeconomic environment index, these positive movements are most pronounced for Hungary, Slovenia, and Estonia. These three countries rank 38, 39, and 43 respectively on macro-economic policy, of the 75 countries ranked. They are therefore most ready to launch potentially successful strategies to accelerate the development of a knowledge economy, but the other accession countries are not far behind. The ranking suggests however, that there is more to do, in particular in adding the requirements of a knowledge economy to the various considerations which enter into the making of economic policy. A national knowledge strategy for a country would define what these broad economic policy considerations are in a particular country context.

15. **Openness to Trade and Foreign Direct Investment.** Trade is an important element of technology deepening because it brings to a country a constant flow of knowledge—embodied in high-technology-content goods, services, and intellectual property. Knowledge in itself is a traded good. Competition engendered by free trade is the foundation upon which demand for technology rests. Similarly, foreign direct investment has consistently proven to be a source of new technologies, to create technology learning opportunities, and in general to contribute disproportionately to technological advance. Most EU accession countries are relatively open, and are beginning to meet this prerequisite. Hungary is particularly open with regard to foreign investment. Foreign direct investment in Hungary amounted to E 2.1-2.2 billion last year, according to Vilaggazdasag. Czech Republic and Poland are similarly open. The recommendation is that trade policy and policy with respect to foreign investment evolve further to create conditions needed for the development and acquisition of knowledge through open trade and investment. A country knowledge strategy would propose the appropriate policy with respect to trade and foreign investment in this light.

16. **Credit and Financial Sector Policies.** The arguments on trade and openness are valid for credit and financial sector policies as well. In general, the quality and maturity of the banking system will affect the ease with which a country can transform its industrial technological capability using global knowledge. Recommendations would be made in country knowledge strategies regarding the connection between credit policy, financial sector development, and the knowledge economy. Financial sectors must function in such a way as to provide funds to innovative companies. Some countries have used directed credit to ensure the high-tech or other preferred sectors obtain funds. This is probably not the best approach in EU accession countries. More work needs to be done on policy stimulants for encouraging venture capital investment, which is found to be an important ingredient for innovation.

17. **Intellectual Property Rights** (IPRs) issues are growing more important, complex, and in many cases, contentious as knowledge is globalized. Past debates have tended to pit interested stakeholders against each other, arguing blanket positions on whether or not strong intellectual property protection is “good for developing countries.” Current research on IPRs recognizes their growing significance in international goods and services, their relevance to foreign direct

\(^{11}\) The World Bank has recently published a study which looks at the evolution of economic policy in all of Central and Eastern Europe, including the former Soviet Union: World Bank, 2003, Transition, The First Ten Years, Analysis and Lessons for Eastern Europe and the Former Soviet Union, Washington, D.C.
investment, and their roles both in creating incentives for R&D and innovation, and in promoting the diffusion of knowledge. At the same time, it acknowledges that IPRs create “winners” and “losers” both within and across national boundaries, that issues vary from sector to sector, and that the challenges are growing with the complexity of “knowledge-rich” goods and services. Most EU accession countries require assistance with the regulatory framework, including most importantly IPRs. All have plans to develop business law and protection of IPRs. For example, Latvia has passed a new commercial law to reform business regulation. Poland has focused on support of small and medium enterprises. Business regulation, protection of IPRs, and the nature of support to innovative SMEs needs to be part of a national knowledge strategy.

18. **Domestic Competition Policy** deals with the issues that surround the ease of entry of firms into markets. New firms, often foreign, bring new knowledge and technology. Barriers which reduce entry, or cut off competition reduce or eliminate this source of knowledge and technology. State ownership of enterprises or state-sanctioned monopolies have the same negative impact, reducing the incentive and demand for new technologies and knowledge because profits are assured by protective barriers rather than rapid innovation. Lessons from experience show that technology development occurs most where firms have an equal chance to compete in a given market, and where success is determined by meeting customers’ needs productively, not by overcoming artificial or political business barriers. In the absence of these conditions, firms are more reluctant to undertake risky commercialization of unproven technology or to invest to obtain new technology from abroad.

19. Many EU accession countries are in the process of introducing competition policy. For example:

- Latvia has an explicit policy of creating a competitive industrial structure and has created a national innovation program in part to stimulate competitiveness of its enterprises.

- Poland is providing advisory services for business operators, and supporting technology transfer to enterprises. A Polish Technique and Technology Agency has been created to help do this, and 270 regional innovation and entrepreneurship centers set up. A Polish Act on protection of competition policy and of consumers, which entered into force in 2001, brings Polish competition policy into conformity with EU rules.

- Romania has created a Legislative framework for increased competition through its competition law and its law on state aid. Enhancing the administrative capacity of Romania’s competition authorities in envisaged by this law.

20. **Lowering the Cost of Risk Taking.** The uncertainty inherent in innovative activity can sometimes lead to under-investment in R&D and technology commercialization. Government intervention to lower the risk that firms face in undertaking innovation is common in most OECD countries, despite the fact that the cost-effectiveness of such interventions can be poor. One of the most common policies in EU member countries is preferential tax status for business R&D expenditures. The disadvantage of this policy is that it often subsidizes large, successful companies that have substantial revenues, and are likely to undertake R&D even in the absence

\[12\] This is a major finding in the World Bank study of the first ten years of transition in Central Europe and former Soviet Union: Transition, the First Ten Years ..., op. cit.
of incentives. These type of policies require scrutiny to determine their appropriateness in the EU accession countries.

**Education and Human Capital**

21. The populations of the EU accession countries have a high literacy rate and the educational infrastructure is well developed (see spider web charts above for data on each country). However, educational attainment does not fully meet the needs of the private sector in terms of the knowledge being produced and the adaptability of the workforce. The education system should perform four roles with respect to knowledge (from WDR 1998). It should provide the broad basic education that makes a populace literate, imparting both everyday skills and intellectual abilities needed for an informed citizenship. Secondly, it should stimulate interest and prepare adequate numbers of young people to pursue careers in science and technology. Thirdly, it should educate a diverse labor force and develop skills at various levels of sophistication, including skills needed to navigate in the knowledge economy. Finally, it should conduct research and advanced training that creates the highly trained specialists needed to advance the frontiers of knowledge and its applications.

22. A complex nexus of institutions and actors makes up national higher education systems. In the EU accession countries, these usually include technical and professional schools, regional and provincial universities, and the national technical universities. Normally, technical universities and institutes are the locus of a country’s main efforts in knowledge production and advanced human capital training in science and technology. Technical and professional schools and regional universities often seek to provide mid-level technical skill to large numbers of students in areas with strong immediate labor market demand. However, there are two important issues facing most EU accession countries. First, available data show that an excessively large proportion of their workers are not prepared for knowledge-based jobs, which is in large part a failure of the education system. Secondly, related to the above, gross enrollment rates in tertiary education are very low in all EU accession countries.
Percent of 16-65 Years Who Test at Low Information Processing Levels (1994-98)

Source: IALS 2000
23. A country knowledge economy strategy would explicitly address how knowledge production moves from universities to users such as firms, professional services, and government. Significant emphasis would be given to institutions whose purposes extend to training and production of knowledge as a public good. It would propose reforms needed to allow these institutions to develop both the research base, and the skilled people, needed for a knowledge economy to flourish. Distance learning would be part of the education strategy needed to support a knowledge economy. Lifelong learning, and policy stimulus for greater mobility of students and teachers, are also ideas that are likely to be reflected in the education strategy for a knowledge economy. Preparing workers to take decisions, to learn, to deal with non-routine problems would be integral to reformed education systems. Boosting EU accession country gross enrollment rates in tertiary education from the current 17 – 27%, to the nearly 60% characterizing the OECD countries, would be part of a knowledge economy agenda. Increasing education efficiency (reducing cost per person educated) would be part of a knowledge economy agenda.

24. A review of current education reform plans in EU accession countries suggests considerable awareness of these issues.

- Estonia has a comprehensive education reform program connected to labor market needs and to R&D needs. The Estonian National Education strategy focuses on vocational education and higher education. In higher education, priority is given to engineering, technology and teacher training. Adult re-training is also included.

- Latvia is connecting all state libraries and schools to the Internet, and providing universal information literacy through its schools.

- Lithuania has an education reform program focused on the quality of higher education, and including reform of curricula (more science based), distance education, adult training and greater international contacts.

- Slovakia and Slovenia have announced education reforms. In Slovenia, an expanded proportion of Government budget will go to education.

- Bulgaria emphasizes vocational training and continuous adult training. National knowledge economy strategies would evaluate the quality of these reform programs with respect to their suitability for a knowledge based economy.

- Hungary is currently implementing a comprehensive higher education reform project, between 1996-2001, supported by the Bank. The overall objective of the reform is to (a) increase responsiveness to social and economic needs, (b) improve the operating efficiency of the system, (c) mobilize private finance, and (d) improve equity in higher education finance. As a result of the reform, during the period 1995/96 and 2000/01, the gross tertiary level enrollment rate increased from 18 % to 30 %. During the period of 1995/96 and 1999/2000, the total spending per student as a percent of per capita GDP decreased from 121 % to 70 %. Private finance in higher education has grown
significantly. Within the framework of the reform, programs are currently implemented to adjust national R&D efforts more to private sector demand.\textsuperscript{13}

**Information and Communications Technology Infrastructure**

25. Since the early years of the transition to market-based economies, all of the EU accession candidates had an expansion in mobile phone networks, opened Intranet services to private investors, partially privatized the fixed-telephone line market, and reduced subsidy of household telephone access. There was rapid fixed telephone line growth. In Czech Republic, there were 15 telephone lines per 100 inhabitants in 1990. This grew to 56 lines per 100 inhabitants by 1999. Cellular use also increased rapidly, for example in Poland going from 95,000 subscribers in 1995 to 6.5 million in 2001.

26. Despite the progress, there is considerable investment and reform needed in information and communications technology in accession countries to bring them to EU standards. But the pay-off could be very large. The agenda includes extending access by the populations of the countries to a wider range of information and communications technologies. These include further development of wireless communications, the internet, cable, satellite networks, computers (including personal computers), optical fiber rings, data storage centers and broadcasting facilities. Legislative and regulatory changes will be needed to facilitate further commercial exploitation of the Internet.

27. In Poland, there continues to be some state ownership of telecom. In Romania and Slovenia telecom is largely a state owned monopoly. In all EU accession countries, full privatization is needed, combined with full competition backed by a strong and independent regulator. E-commerce and e-government applications need to be further developed. Reforms will be needed in traditionally overlooked services such as post offices. Rural areas will need more attention as they are usually the last to benefit from ICT improvements. This might include a reformed postal system, and projects which introduce shared wireless telephones and internet connections in villages. Because the poor are often overlooked, especially the rural poor, an explicit strategy to allow them access needs to be part of these programs. This is one area that donors can help (setting up rural tele-centers, and financing cell phones and internet connections as part of agricultural marketing projects). Building local capacity to manage the various ICT technologies would also be part of a knowledge economy strategy.

28. Several EU accession countries already have interesting initiatives which can be shared with the others and on which a broader ICT infrastructure program can be built.\textsuperscript{14} These are largely consistent with the EU’s e-Europe + 2003 Action Plan. For example:

\textsuperscript{13} The World Bank, Implementation Completion Report No. 23235, November 6, 2001

\textsuperscript{14} The commitment of several EU Accession Countries to ICT development is reflected in the cooperation agreement of the “Visegrad Four Countries”: Visegrad Four Countries, September 21, 2001 “Knowledge-based Economy Working Group”, Proposed fields of cooperation. Minutes of Working Group meeting in Budapest held on September 21, 2001. A good analysis of ICT developments in the accession countries is found in European Commission, April 1999, International Communication Technologies and the Information Society Panel Report, No. series 03, European Commission, Institute for Prospective Technological Studies (Seville) TECS-Futures Programme.
• Hungary has launched several e-government activities. The Government has established by decree a new agency within the Prime Minister’s office to act as a catalyst for the emergence of an information society (the Office of the Government Commissioner for Informatics). The government’s Information Society Strategy includes efforts to provide computers to public servants, subsidies for small and medium enterprises to enter into e-commerce, promotion of non-profit content providers on the Internet, measures to facilitate access to the Internet by disadvantaged communities, and a plan to build a fully electronic service-oriented public administration. Local government administrations in Hungary are also using ICT. For example, the city of Budapest plans to put all municipal procurement on the Internet.

• The Ministry of Communication in Romania has ambitious plans to fully exploit the Internet for a wide variety of public services. It includes bringing Internet and multimedia to schools, cheaper Internet access, accelerating e-commerce, introduction of smart cards, government on-line, provision of risk capital for high-tech enterprises, education system to introduce digital literacy, and ICT applications in health, transport, and education. Several laws are being prepared to assist this process, including the law of e-signature, law of e-commerce, and the law on protection of personal data.

• The Czech Government has a policy spelled out in the “Government Information Policy – Way to an Information – Oriented Society” paper (May 1999). In it Government states that it intends to help the Czech population achieve computer literacy for all. It will provide public information services through electronic means so that all citizens have access to Government information. A legislative act on protection of personal data has come into effect in June 2000. The Czech telecommunications office was transformed into an independent regulator as of July 2000.

• Estonia boasts one of the most modern telecommunications networks in Europe, low connectivity costs and high rates of computer literacy, even by Western European Standards. Twenty-eight percent of Estonia’s population is connected to the Internet. Estonia’s strategic investment in wiring the entire country has led to an explosion in ICT applications in banking, education, health, transport, and public administration. Through a progressive de-monopolization of the telecommunications industry- mostly through the liberalization of the wireless sector- -a more aggressive and diversified approach to the advancement of ICT-related solutions has emerged. These varied options- -combining wires, lease lines and fiber-optic networks- -allow for a sustained roll out of infrastructure and improved rural connectivity. Estonia ranks among the top 20 countries worldwide for teledensity as a result of the focus placed on the development of the core network infrastructure and provision of access to the general population. This was accomplished through a concession agreement with the Estonian Telephone Company. The company helped to ensure connectivity in rural and scarcely populated areas in return for lucrative urban contracts. By 2002, Estonia will have 300 public Internet access points providing free e-mail and Internet access. These points will also serve as e-government access points where citizens can conduct the majority of their transactions with the public.

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15 Romania’s Minister of Communications, Dan Nica, has completed an article entitled “Knowledge Based Economy—An Opportunity for Romania” setting out Romania’s ambitious plans in the IT area, but also looking at human capital and competition.
administration. Through another initiative, known as Tiger Leap, all of Estonia’s schools have been connected to the Internet.

- Latvia’s policy directions, include development of information technology, including through liberalization of the telecommunications market. Government will establish a fund to provide universal telecommunications services to most of the Latvian population. An e-Latvia program is underway consistent with the eEurope + 2003 Action Plan. Results so far include the availability of Internet in 24 regional centers, with 150,000 Latvian Internet users. Government intends to connect public institutions to the Internet, and provide for information literacy.

- In Lithuania, Government has an information society development program focused on computer literacy, use of IT by the public administration, electronic business, culture and language. It establishes public Internet access points, an academic Internet network, IT training, a public database, electronic person identification, e-Government (government services through the Internet). Legislation is being developed to regulate electronic business, and to encourage competition in the telecommunication sector.

- Poland’s e-Poland is based on the eEurope + 2003 Action Plan. Poland’s Information Society Development Plan includes universal access to information, education in informatics, fight against cyber crime, e-economy, use of IT for Government services, and development of a “tele informatic” market. Civil service vacancies in Poland are already published on the Internet.

- Slovenia intends to liberalize its telecommunication market, while modernizing it and providing universal access to it. It intends to provide fast access to the Internet to all Slovenians. Government will stimulate the development of e-commerce, e-banking, and distance learning.

**Innovation Systems**

29. In the OECD and the EU it is the private sector that funds the bulk of applied research and product development, although public-private sector partnerships for R&D and knowledge creation also remain important. In comparison, prior to the transition, many EU accession countries conducted research through world class research centers that were funded mostly through the central planning process. In the course of government downsizing and privatization during the 1990s, these subsidies dwindled and in many cases vanished almost completely. Most public sector research institutes in EU accession countries are now ill-equipped to meet the needs of the private and public sectors. Many of these institutes would like to retool, and adapt new or existing technologies to the demand emanating especially from the private sector. However, in order to do this, many will need substantial restructuring, and some will disappear entirely.

30. The results of this decline are apparent from some data. R&D expenditures as a % of GNP (1987-1997) are somewhat over 2% in Europe and the G7. The percentage varies in the EU accession countries from a low of .4% in Latvia, from .5 to .7% in Estonia, Bulgaria, Bulgaria,

16 World Bank data, see World Bank Institute Indicators, used to prepare charts shown above.
Hungary, Lithuania, Romania and Poland, to a high of nearly 1.5% in Slovenia. Patent
applications are similarly very low in most accession countries, with Slovenia being the top per
million population, followed by Hungary and the Czech Republic.

31. A central issue is whether it is more cost effective to acquire knowledge and know-how
from foreign entities, or to fund the development of the same using national capacity or a mix of
the two. Strategic alliances with foreign companies can provide (in some cases already provide)
for the transfer of know-how, provided that scientists and technicians absorb the lessons from
their foreign counterparts and are able to bring their knowledge of local markets into the process.
Rather than having the luxury of a generational change process, most EU accession countries
need to be able to jump start their innovation systems through the acquisition and/or adaptation
of world class knowledge to their production processes in order to be competitive in a single
European market. This would be a major area of enquiry in a country knowledge strategy.

32. In the past two years, most EU accession countries have recognized the above problems,
and have begun addressing them. For example:

- Estonia is producing a strategy on R&D (“Knowledge Based Estonia”). It will build a
  bridge between scientists and entrepreneurs by linking R&D centers with enterprises.
  Government will support development of bio-genetic, and industrial technologies.

- Latvia’s national innovation program will support innovative enterprises, and provide
  legal acts which “favor” innovative business.

- Poland has a program entitled “The Enhancement of Innovativeness in Poland’s
  Economy by 2006” adopted in July 2000. It will provide support to provincial level
  innovative projects. A technique and technology agency, and 270 regional innovation
  and entrepreneurship centers will promote innovation. Poland has budgeted EUR 20
  million from EU Phare, PLN 7.7 million from Government.

- The Government of Slovenia intends to intervene directly in stimulating R&D. It intends
  to do this by stimulating cooperation between companies and R&D centers in research,
  facilitate transfer of technology to enterprises, sponsor private research institutes, tap into
  the research potential of Slovenians working abroad, and creating a policy and
  institutional environment conducive to technological development.

Country Knowledge Strategy

33. What would a country knowledge strategy look like? The box below briefly summarizes
the national knowledge strategy done for South Korea by a joint South Korean and World Bank
team. The content of South Korea’s knowledge strategy has many of the same elements
summarized in the above description of EU accession country plans. The main difference is the
comprehensiveness of the South Korean plans, the importance of the consultations undertaken
with the Korean population on draft plans, and the detailed action plans which followed. OECD
now ranks Korea third in the world in terms of development of a knowledge economy, so there
has been an outcome.
Knowledge Is Key to Sustaining Growth: The Case of Korea

“The global explosion of knowledge now underway may lift hundreds of millions of the world’s poor out of poverty, or it may create a widening knowledge gap in which poor countries lag further behind,” says Carl Dahlman co-author of a study by the World Bank and the Organization for Economic Co-Operation and Development (OECD) entitled Korea and the Knowledge-Based Economy: Making the Transition, 2000.

The study presents a comprehensive set of national policy responses to the knowledge revolution. Korea has limited natural resources. It has developed mainly through an outward-oriented industry-led strategy based on large firms and economies of scale. But now this industrial paradigm is being challenged by the rapid rise of knowledge as the principal driver of competitiveness in Western Europe, North America and Japan. In order to compete, Korea will have to increase its productivity and the efficiency of its investments in both physical capital and knowledge. The report proposes that this be done through more effective investments in education, information infrastructure, and research and development.

A brief sample of the recommendations made in the report include the following:

- Government should adjust the economic incentive regime to promote R & D, knowledge acquisition and sharing
  - Strengthen intellectual property rights, their enforcement and the promotion and valuation of intangible assets
  - Government to foster entrepreneurship (entrepreneurs innovate)
  - Undertake those policies necessary to strengthen foreign and domestic competition (competitive firms are more likely to innovate)
  - Improve equity and venture capital markets (which finance innovative knowledge based companies)

- Education reform is needed, consistent with the requirements of a knowledge economy
  - Reforms in university curriculum and management are proposed which will make them more open to global knowledge and improve teaching of science and technology
  - Lifelong learning is to be introduced
  - Outcome driven governance systems in education will be introduced to promote educational quality at all levels
  - Links to the global education system will be strengthened (strategic alliances between universities, faculty exchange, curriculum in English and on information and communications technology)

- Develop Information Infrastructure in a manner which is consistent with the needs of a knowledge economy
  - Set up an independent regulatory agency for the telecommunications industry
  - Liberalize the telecommunications service industry, opening it to foreign investment
  - Regulate e-commerce, consistent with international standards

- Reform of the “innovation system” to make it more efficient
  - Encourage greater interaction among firms, universities, and government research programs
  - Evaluate and justify any public intervention in innovation systems
  - Provide government support to R & D in large companies on stricter conditions, and stimulate private industry partnerships with other actors (universities, public laboratories)
  - Provide universities with resources to increase the basic research effort
  - Reform the government research institutes, pushing them to do more upstream research, less research which duplicates that of private industry, and to undertake public interest research that will not be done by the private sector
  - Improve support to small and medium enterprise knowledge acquisition, with emphasis on networking
  - Encourage contacts with foreign counterparts through academic and research exchanges, technological co-operation, joint ventures, participation in international regulatory bodies
  - Undertake evaluation exercises of research undertaken by various Korean institutions

The report fleshes out the above recommendations with detailed proposals. It then proposes an implementation plan. Implementation began with public hearings, and then consultations with think tanks and the private sector on the reforms proposed. It then extended the consultations to the broader public. The government has a three year master plan to implement the strategy. It focuses on developing the national information infrastructure, improving national science and technology innovation capabilities, develops new knowledge industries and digitizes older industries, develops the human resource system to respond to the knowledge economy, and addresses the “digital and knowledge divide”. Task forces have prepared detailed action plans. The Prime Ministers office is responsible for managing overall implementation. There has however been resistance to many of the measures. Strong resistance to reform developed in the education system.
IV. THE KNOWLEDGE ECONOMY AND RURAL DEVELOPMENT: HOW TO DEAL WITH BACK-WARD REGIONS AND A LAGGING SECTOR

34. In the EU accession countries, “backward” rural regions host many of the poor (though there are also many urban poor), and are particularly difficult to reach. This chapter treats the issue of how to bring a single sector (agriculture), and backward regions which are dependent on agriculture into the global knowledge economy. Chapter IV undertakes a similar analysis for the urban poor. These chapters have been elaborated because (a) the preceding analysis as well as most of the work on the knowledge economy does not look at the particular constraints to giving the poor access to its benefits, and (b) a focus on the poor is the role of development agencies.

35. The knowledge gap in Central European agriculture is suggested in the chart below by the lower grain yields than in OECD countries. A contributing factor to lower grain yields is lack of knowledge by accession country grain farmers. In many cases, they use inefficient and antiquated technology. Of course lower yields are also the result of policy problems, and constraints on input supply and investment. Disentangling the impact of all of these deficiencies is difficult. But surveys suggest a knowledge gap. The chart below shows that agricultural production has declined in the Region as the transition to market began. Application of knowledge to agriculture would be one factor to stimulate its growth.

![Cereal Yield, 1999](chart)

**CIS:** Confederation of Independent States (Former Soviet Union)

**CEE:** Central Europe (mostly EU accession countries)

**Source:** World Bank Data
36. The preconditions for knowledge acquisition and dissemination in agriculture are the same as for the economy as a whole.
Agriculture needs a regulatory environment that enables the free flow of knowledge, stimulates investment in ICT, and encourages entrepreneurship by farmers and agro-business. It needs a good macro-economic policy, and growing demand to encourage the use of knowledge for profit by farmers.

Agriculture and the enterprises that constitute it require an educated and skilled rural population, as well as educated managers and staff in agro industry and rural services.

A dynamic information infrastructure is needed to serve rural areas, ranging from radio to the internet.

The network of research centers, universities, think tanks, private enterprises and community groups serving agriculture and rural areas must be able to tap into the growing stock of global knowledge, adapt it to local needs and create knowledge for local agriculture and agro-industry.

37. The policy and regulatory system affecting rural development is improving in Central Europe and the Baltics since 1990. For example:

- Over 50% of agricultural output, most agricultural land and most agro-processing is in private hands.
- Prices, markets and trade have been partially liberalized in most of these countries.
- Local people are better empowered to choose what to produce, buy and sell.
- Laws and institutions for market economies exist.
- Macro economic policy is broadly adequate in Central Europe and the Baltics.

38. Despite the progress on the policy front, there are numerous policy challenges facing agriculture in the EU accession countries, which are needed both to develop the sector, and to facilitate its access to knowledge.

Key agricultural policy challenges include:

- Completion of the liberalization of prices in several countries
- Completion of the liberalization of internal factor markets (land, labor, capital)
- Liberalization of the international trade regime
- Elimination of distortionary subsidies and taxes
- Further reduction in state participation in productive and commercial activities in some countries.

Completion of farm restructuring, land privatization, creation of modern cadastre, titling and registration are needed in all countries to fully develop emerging land markets.

Public investment is needed in rural infrastructure (rural roads, irrigation rehabilitation, water, telecommunications, energy, and social infrastructure).

Reform of agricultural innovation systems.

39. Knowledge is traditionally brought to rural areas and to agriculture through agricultural research and extension, and through agricultural education. Agricultural knowledge creation and transfer in the Communist period was centralized by the state, through state research organizations: the academies and universities. Knowledge was directed at maximizing crop yields (production per hectare) rather than farm profit. Some Western European and North American agricultural knowledge was copied and used, but most was developed by the academies and universities. Agricultural schools and universities also trained agricultural engineers and agriculturalists. These trained people then became the managers of collective and state farms, operating under the instruction of planning and research authorities. Knowledge was transferred quickly and efficiently to these directors, who applied it directly to their farm operation by following orders, and based on their education.

40. The pre-transition system of agricultural knowledge creation and dissemination is now inoperative. The collective and state farms are progressively being divided up into private farms; in some countries this process is almost complete. This has disrupted the knowledge transfer mechanism. There is no longer a connection between planner, research institute and farm director. The research institutes obtain little government funding and in nearly every accession country face serious financial and personnel crises. The government planning institutions have largely disappeared. Directives rarely come to the farm from Central Government. The agricultural universities continue to exist and obtain government funding; there is potential here to expand their role as developers and disseminators of agricultural knowledge, as such institutions do in North America and in Western Europe. The big challenge is to re-create a knowledge development and transfer system directed to private farmers and private agro-business, in some cases using reformable institutions which exist already (the universities for example), and in some cases through new mechanisms and institutions.

41. There are many models of agricultural knowledge development and dissemination in OECD countries which work and which are potentially relevant to the EU accession countries. There are also new innovations and transfer mechanisms only now being explored in the West and in some developing countries that could help jump start this process. Examples are the use of information and communications technology serving rural people and backward regions, public-private partnerships in knowledge transfer, and farmer to farmer mechanisms of knowledge sharing.
OECD country models of agricultural knowledge creation are diverse. They include:

? State owned and operated agricultural research stations;
? University (private and state owned) agricultural research;
? International agricultural research centers, financed with international and state grants;
? Private agricultural research, done largely by large corporations (Monsanto, Hoechst, Narvartis, Pioneer Seed, Cargill are some of the best known).

OECD country models of Agriculture knowledge dissemination are equally diverse:

? Agricultural schools and universities disseminate knowledge to students who take the knowledge back to farms and to enterprises;
? Research universities and state owned research stations often extend new knowledge directly to farmers;
? Most countries have agricultural extension systems which transfer knowledge to farmers through direct contacts, mass media, agricultural fairs, schools, clubs, and cooperatives. These can be:
  - state owned;
  - Cooperative (farmer) owned;
  - Public university owned and managed;
  - Partially publicly financed private extension agents;
  - Subsidized or unsubsidized;
? Private input suppliers, processors and marketing enterprises disseminate knowledge about input use, markets, and product requirements directly to farmers;
? The newest innovations in the dissemination of knowledge are to make use of mass media, internet, continuous adult training.

Based on the current status of the World Bank’s EU Accession Country Rural Development work and the experience of the OECD countries, the Rural Knowledge agenda in the EU accession countries, (beyond improvement to economic and agriculture policy) needs to include five broad elements:

(a) Reform the agriculture research institutes and academies;
(b) Develop agriculture extension capability directed at private farmers;
(c) Improve agriculture education at all levels, but particularly the agricultural universities;
(d) Develop knowledge systems for agro-processing, marketing, and input supply enterprises;
(e) Introduce new approaches to knowledge capture and dissemination to farmers using information and communications technology;

45. **Reform of the agriculture research institutes and academies** can be undertaken in the following ways:

? Governments should decide to downsize and/or close the weakest research institutes and academies, based on an analysis of each or based on an agriculture research master plan sponsored by Government.

? The remaining Academies and institutes should be reformed by their own management, through improved management systems, and improved research programming.

? The remaining research institutes should partner with international agriculture research institutes (being done, for example, in Central Asia and Caucasus), and with other private and public research institutes from OECD countries. This would require more active involvement by Western agriculture research establishments (particularly from the European Union).

? Agriculture Research should be opened to diverse actors – private, public, NGO, international (see the competitive grant scheme proposal below).

46. In the absence of the above strategy, benign neglect is most likely in which nothing is done, while many Academies and institutes carry on as in the past. This would probably cause most of them to wither and die.

47. Competitive grant schemes have a great potential in the EU Accession countries for supporting agricultural research. In such schemes, grants are made to any provider of research and agricultural knowledge services; private industry, government, university, NGO; domestic and foreign, international and national, based on the quality of the proposal submitted by the provider. An autonomous agricultural board reviews and decides on proposals, and monitors execution. The Board could include members from government, farmers, NGOs, and academia. A Board would typically use peer reviewers to help evaluate proposals, and would have a published set of criteria on which to base evaluations. This system avoids exclusive reliance on the academies or government agencies, but can finance them if their proposals are good. It allows partnering between domestic and foreign researchers, as well as private and public sector researchers. Because it is competitive, it reduces the tendency found in public sector agricultural research bureaucracies to grow fat and complacent on guaranteed annual budget allocations.

48. **Agricultural extension capability, directed at private farmers** will need to be developed. There are several models which have proven effective in OECD countries that might be tried, and some interesting experiments in the EU accession countries themselves that could be replicated elsewhere. Common in OECD countries are systems which encourage agricultural extension by some combination of agricultural universities and schools, local government, agricultural research institutes, the private sector (especially the input supply companies), and farmer organizations. Some interesting initiatives recently started in EU accession countries include the following:

- The Bank-financed Estonia Agriculture project created an agriculture advisory service which uses private agricultural advisors. It is managed by government, which subsidizes the service. Farmers pay a fee for service, and cover part of the cost.
The Bank financed Romania Agriculture Services Project includes competitive grants for extension (as it does for research). These grants are awarded to private, government, and NGO institutions based on the quality of the proposal. The project also supports the use of rural radio, distribution of a farm management handbook, technical assistance and training of extension agents, monitoring and evaluation, and farmer participation in decisions regarding extension.

The Croatia and Macedonia Farmer Support Service Projects create an agriculture research council to manage agriculture research, with majority farmer members. The project introduces structural and management reform to public sector agriculture research and extension, as well as to veterinary services.

49. A third pillar of the knowledge strategy for agriculture and for backward rural regions is to improve agricultural education. The key action needed is to reform and support the agricultural universities. The reforms would include:

- A shift in the curriculum of the agricultural universities to a market orientation. This means in practice, more and better courses on finance, business, economics, information processing, and the introduction of agricultural technologies from elsewhere in the World. Vocational education serving rural areas also needs reform, to make it more relevant to business and to private farming.

- Improved management of the universities (more participatory, less government domination, more private sector involvement).

- Agricultural universities should seek partnerships with an expanding number of Western agricultural universities.

- Teaching efficiency must be increased to match new tight fiscal realities (cost per student graduated must decline). This may include the use of new efficiency generating technologies such as distance learning.

- Some agricultural universities will close.

50. The fourth pillar is to develop knowledge systems for agro-processing, marketing and input supply enterprises. These would be similar to those needed by any other industrial or marketing enterprise. Most important is making the business environment conducive for new entry and expansion of enterprises (domestic or foreign) which bring knowledge. The economic policy environment should be such as to create attractive economic conditions for investment in these sectors. This would include most importantly no excessive restrictions on foreign private investment; streamlined licensing (as per the broader requirements for a knowledge economy), and protection of intellectual property rights. A conducive policy and regulatory environment for farmer cooperatives would help to stimulate creation of farmer organizations which provide services to their members. Finally, the government should provide public access to information.

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regarding government regulations, licenses, taxes, market possibilities related to processed agriculture products.

51. The fifth and final pillar is to introduce new approaches to knowledge capture and dissemination to farmers using information and communications technology. Recent ideas which have been successfully tried in some countries (including EU accession countries) include the establishment of rural tele-centers, each with computers and simple furnishing. These tele-centers provide access to Internet and computer services to the public in rural areas. The Centers should be widely distributed in rural areas, and need to be financially self-sufficient. Services provided by these centers would include maintenance of land records and land transactions, applications for licenses (marriage, market) and certificates, health information, education services (distance learning), entertainment, public dialogue with government officials, business, email, job search, community development, e-government, publishing, establishing clients own WEB site, other software (EXCEL), tax services, weather reports, agriculture extension advice, and e-commerce. Often, private entrepreneurs can be financed to start such services.

52. There are numerous pilot projects around the world which are bringing the knowledge economy to rural people. Hungary is successfully establishing rural tele-cottages. In India, the village phones program involves giving mobile phones on credit to villagers who in turn sell calls and services in rural areas that are not serviced by traditional telecommunication infrastructure. The phones are used to acquire market information, arrange sales, deal with credit, as well as personal business. A similar program in China is used by farmers to market their crops. Farmers call traders directly and arrange sales and logistics over the phone.

53. The Agrasar project in India provides education in rural primary and middle schools through and about computers. With Internet connections, these school computers serve as Internet connectors giving villagers access. Village maps and land records are available on a WEB portal. An open University allows youth to receive education and degrees from their rural village over these school Internet sites. Internet services provide commodity marketing information, copies of land records, on line registration of applications for income certificates, land demarcation, a public grievance redress site, and Hindi email.

54. Western Europe contains relevant examples of transformation of poor rural areas into more dynamic economies through transfer of knowledge. Research was undertaken for this report on the experience of four Western European cases and one North American case of such transformation.  

55. The first case is Ballyhoura in Ireland. It is a region of smallholder farmers which for decades had a highly depressed economy. The turnaround began with local initiative. A Community Consultative Committee was formed in 1990 to address the problem of economic stagnation in the region. The community set out to obtain the ideas, skills, technology and information necessary to rehabilitate its economy. It began with an audit of skills in the

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community. Finding wide-spread deficiencies, the community group obtained technical expertise (knowledge) from University College Dublin. The group obtained EU “Leader”21 funding for vocational re-training, rural tourism development, Information technology, development of small scale enterprises, agricultural innovation, and more broadly knowledge sharing. In agriculture, a new variety of seed potato was introduced. A cooperative markets the potatoes and provides technical support to farmers. Organic farming has been introduced on a wide scale, as has goat cheese production. Residents have been trained in computer skills. A telemarketing job creation initiative has been successful. Other informatics initiatives are getting started due to the pool of cheap but now relatively well trained labor. DELL computers has set up shop in the area. Rural tourism has been successful. The lesson here is that local initiative and persistence is key, outside funding was helpful, importing and adapting knowledge was absolutely critical. Ballyhoura, like much of the Irish countryside is now developing very quickly.

56. A second example is the Valle de Jerte in Extremadura, Spain. El Valle del Jerte was a poor agricultural community in Central Spain, dependent on cherry production. Following a similar pattern to that of Ireland, in 1992, the farmers of the Jerte Valley formed a coalition of 16 cherry growing cooperatives to raise the quality and volume of cherry production. The coalition obtained EC Leader funding to undertake research, technology and innovation in its cherry industry. The program was highly successful, introducing improvements at every stage from production of the cherry to its processing and marketing. Production and exports increased dramatically. Leader funds were also used to train workers, and to promote rural tourism. Farmhouses were renovated into rustic quarters for travelers. Again the lessons were the importance of local initiative and local organization, the importance of external funds, and the key vehicle for the transformation being knowledge transfer.

57. A third example is that of truffle cultivation in Umbria, Italy. About 900,000 people inhabit Umbria. About 80% of Italy’s truffles are processed in Umbria. One company, Urbani, processes and markets most production not used in home consumption. Truffle production and the regional economy have benefited from knowledge transfer by Urbani resulting from research at its agricultural and food technology center (which it shares with the Umbria Regional government). Successful research and development has been undertaken in truffle taste and aroma, truffle cultivation, and the domestication of truffles. It was discovered that the roots of young oak, willow and nut trees nurtured in greenhouses can be inoculated with the spores of truffles. Plantations of treated trees are then intensively managed, with the result that truffle production increases dramatically. Income and employment expansion has been the result. In addition, as in the case of Ireland and Spain, rural tourism has been developed around ”the Truffle and Flavor Road.” The lessons from this case are the transformatory value of an innovative private enterpr ize able to develop and use knowledge for the good of the local rural economy.

58. The case of the Gossym-Comax cotton growth model in Mississippi, USA, is one of promising first results of a knowledge based intervention, followed by failure. Mississippi delta cotton farmers have been economically depressed throughout the 1970s and early 1980s. A knowledge based approach to management of Mississippi cotton farms was developed by

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Mississippi State University based on farm modeling. The model assists farmers with fertilizer, irrigation and other farm input decisions to maximize farm profit. The model was applied on farms with the help of cotton extension agents. The model was used successfully by farmers when it was free, but use declined when cost recovery was introduced. The lesson drawn from this case study was that knowledge initiatives are not enough. The local community has to be involved in demanding and then designing the knowledge application; it cannot come entirely from outside.

V. DEVELOPING THE URBAN KNOWLEDGE ECONOMY*

A. Cities in the Knowledge Economy

59. Cities, and the policies that affect them, play a major role in building a national and global knowledge economy. While 67% of people who live in Central Europe reside in cities and towns, estimates indicate that this will rise to 76% (381 million) in 2030 (Figure 1). Although not all transition countries are urbanizing at the same rate, the lion’s share of the region’s GDP is produced by this urban population.  

![Figure 1: Europe and Central Asia Urban Population Growth](source.png)


* This Chapter was contributed by Margaret Thalwitz, Angela Griffin, Jeffrey Balkind, Ahmed Eiweida, and Ellen Hamilton. It is a work in progress, and is therefore not as comprehensive as the rural Chapter. One proposal for further work is to develop concepts for a city-oriented knowledge economy strategy (see the last Chapter which describes such a proposal).

Applying the concepts of the knowledge economy to urban management suggests the need for a paradigm shift, from resource driven urban economies to knowledge driven urban economies (Figure 2).

**Figure 2: Knowledge Economy as an Agent of Change in Cities**

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<tr>
<th>Old Paradigm: Resource driven economies</th>
<th>New Paradigm: Knowledge driven economies</th>
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<td><strong>Qualitative factors</strong></td>
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<td>Labor</td>
<td>Qualifications</td>
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<td>Raw materials</td>
<td>Research and development</td>
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<td>Premises</td>
<td>Local suppliers</td>
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<td>Bulk transportation</td>
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<td>Energy</td>
<td>Good living conditions</td>
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<td><strong>Subsidization</strong></td>
<td><strong>Entrepreneurial</strong></td>
</tr>
<tr>
<td>Tax allowances</td>
<td>Friendly and stable policy environment</td>
</tr>
<tr>
<td>Grants and direct subsidies</td>
<td>Effective and honest promotion</td>
</tr>
<tr>
<td>Low user charges and rents</td>
<td>Competitive attraction of capital, innovation and qualified labor</td>
</tr>
</tbody>
</table>

Source: Adapted from Professor Grzegorz Gorzelak, Warsaw University (2001)

The key factors influencing a city’s competitiveness and its integration into the global knowledge economy are as follows:

[Diagram showing various factors related to city competitiveness]
62. Policy makers and city managers would need to address the following key questions in devising a city-based knowledge economy strategy:

- Do municipal utilities have access to the most up to date knowledge to enable them to increase the effectiveness and efficiency of their operations so that the costs of the services they provide are not an impediment to doing business nor an impediment to a high quality of life in the city?

- Are the educational and professional standards and trends increasing or declining in response to the human resource needs of the knowledge economy? Does the city provide the necessary standards and levels of education that will equip the urban community for the future?

- Does the city government use e-government techniques to streamline regulatory and other relationships which have an impact on the quality of life and economic viability?

- What is the level of computer expertise in the city, in the community and in the private sector?

- What is the perceived level of effectiveness of the city in providing a good quality of life and what do businesses think about doing business in the city?

- Does the city maintain through its institutions and universities an up to date monitoring and evaluation system that enables the decision makers to better plan for successful development and investment?

- How does the city develop and capture new knowledge, where does it come from and how do crucial sectors gain access to it?

63. Table 1 below illustrates the broad content of an urban knowledge economy strategy.
**Table Legend**
RC: Rest of Country  
ICT: Information and Communications Technology  
R&D: Research and Development

### TABLE 1: KNOWLEDGE BASED ACTIVITIES FOR AN URBAN AREA

<table>
<thead>
<tr>
<th>SUPPLY SIDE</th>
<th>DEMAND SIDE</th>
<th>DEMAND SIDE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Regulation &amp; Economic Environment</strong></td>
<td><strong>Civil Society</strong></td>
<td><strong>Public Sector</strong></td>
</tr>
</tbody>
</table>
| Enabling environment for market led growth:  
• Local credit markets  
• Land markets  
• Business friendly institutions | Involvement in decision making process:  
• More open societies  
• Better governance  
• More communication  
• Modern IT systems | Legitimacy (civil society is engaged in deliberation in shaping KE regulations) |
| Less capacity in outlying region | | Legal framework for development:  
• Transparent and streamlined municipal regulatory environment to encourage urban formal economy and assimilate “informal” economy |
| **Skilled/Quality Population** | **Use of their knowledge:**  
• Municipal support for NGOs  
• Access to municipal information in secondary national or international languages  
• Provision of portals | Reliance on indigenous knowledge |
| **Urban labor force:**  
• Private companies in EU member countries and EU accession countries have strong knowledge capacity and needs.  
• They are technically oriented | | Increased resources to enhance urban KE:  
• Municipal support for quality in education  
• Municipal sponsorships, internships, apprenticeships  
• Municipal hiring and procurement policy/practice |
<table>
<thead>
<tr>
<th>Information Infrastructure</th>
<th>More interactive role:</th>
<th>Access to opportunities:</th>
<th>Increased investment in information infrastructure:</th>
<th>Learning alliances among cities:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>•Privatization of urban services</td>
<td>• Availability of, and access to, local information, including local government</td>
<td>• Automation of local government and other public institution administration</td>
<td>• International alliances and networking for benchmarking</td>
</tr>
<tr>
<td></td>
<td>• Local provision of ICT products and services, including e-commerce</td>
<td>• Availability of ICT to household &amp; businesses</td>
<td>• Decentralization of government’s own operations</td>
<td>• Interregional interaction</td>
</tr>
<tr>
<td></td>
<td>• Better communication, e.g. the city</td>
<td>• Access to international R&amp;D</td>
<td>• Internet enabled access to quality municipal information sources, e.g., planning and land use, license regimes</td>
<td>• Local economic development initiatives</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>R &amp; D and mass publication to spread information broadly</td>
<td></td>
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<table>
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<th>Multinational technology:</th>
<th>Partnership:</th>
<th>Intergration of innovative/specialized networks outside cities</th>
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</tr>
</thead>
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<td></td>
<td>• Partnerships and attraction of new businesses - start ups and SMEs</td>
<td>• Mechanisms to encourage dialogue, feedback, and to monitor urban quality of life</td>
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<td>• Interregional interaction</td>
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<td></td>
<td></td>
<td></td>
<td></td>
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VI. A WORLD BANK STRATEGY FOR ASSISTING EU ACCESSION COUNTRIES TO DEVELOP A KNOWLEDGE ECONOMY

A. The Broad Approach

64. The previous chapters argue that accelerated integration of EU accession countries into the knowledge economy will require reform of education, information and telecommunications sectors, innovation, and improved public sector management and economic policy. Special attention will need to be paid to the access of the poor, particularly the hard to reach rural poor. Finally, there is some opportunity to develop focused knowledge economy strategies for cities.

65. The question for the World Bank is how it can most effectively help those EU accession countries which seek its advice and support, to integrate into the global knowledge economy. A preliminary strategy for the Bank has been developed below, which is in the process of discussion with the countries themselves, and with other partners in the development business. The strategy for the Bank is a graduated one which consists of a combination of training, advisory work, economic and sector work, and support to investment projects. It reflects the fact that people in the accession countries must lead this effort. The Bank’s input will be minor in comparison. In addition, other institutions outside the countries themselves, such as the institutions of the European Union, have more to contribute than does the Bank. The work by the Bank and its partner institutions would deal with the knowledge economy aspects of the education, telecommunication, public sector, science and technology sectors, including electronic transmission of services and information. For EU accession countries that do not graduate in the next two years, the Bank will be able to provide deeper support through its traditional instruments of loans, small grants, analytical services, advice, and equity investment.

66. The first step of the Bank’s proposed input for all EU accession countries is to organize conferences where OECD country knowledge and competition policy is presented and diagnosed for relevance and in which EU accession country knowledge strategies are developed and discussed. Step two for the Bank will be to assist where requested, in the development of these national knowledge strategies. In step three, once national strategies are complete, the Bank, in cooperation with EBRD, EIB, and others, can undertake loans, partnerships, and technical assistance, distance learning, e government, and ICT projects to support the strategies.

67. This three-step model of assistance is being followed by the Bank in Brazil, India, and China (see box below). The knowledge conference undertaken by these three countries in early 2001, brought together each country’s knowledge leaders. Leaders came from the Universities, government, the innovation minded private sector, and research institutions. These people, along with donor and private sector representatives, discussed the constraints and opportunities for developing a knowledge economy. This group then assisted in developing national knowledge strategies, with country representatives taking the lead. The strategies provide recommendations to government, NGOs, the private sector, the Bank, and other donors. Recommendations involve regulatory and legislative change to open the economy to both importing knowledge, and developing and applying it locally. Institutional and policy reforms needed in the educational,
information infrastructure, and innovation sphere were recommended. Recommendations were closely connected to science and technology policy. A similar knowledge forum for the EU accession countries, will take place in February 2002.

A Knowledge Forum for Brazil, China, and India took place from March 19-25, 2001 at Wilton Park, U.K.

This Policy Forum for high level participants from Brazil, China, and India, was sponsored by The World Bank Institute, in partnership with the British Council, the OECD, and the education and telecom units of the Bank.

Objective: The aim of the policy forum was to provide a platform for the sharing of strategies of how to take advantage of the rapid creation and dissemination of global knowledge among three large countries (Brazil, China and India) representing 45% of the world’s population. Teams of 12-15 participants were invited from each country. Half the members of each country team represented key government ministries (finance, planning, education, telecommunication, science & technology, and representatives from a state government that were implementing innovative knowledge strategies); the other half represented non-government sectors (private sector, academic community, think tanks, NGOs, and mass media).

Outline: The first day provided a framework. On the second day participants discussed knowledge strategies for their countries and issues of political economy and governance. The third day's presentations highlighted the challenge that the knowledge revolution and globalization put on formal and informal education systems. The fourth day was dedicated to critical issues of information infrastructure and to a discussion of unequal development and the challenges facing large rural populations. The fifth day consisted of presentations of innovation systems and future global scenarios. On the final day each country team sketched out the main elements of an integrated strategy to help their country make more effective use of knowledge.

There were three keynote presentations: The Challenges and Opportunities of the Knowledge Revolution by Lia Borthwick, Knowledge Management Specialist, British Telecom and The Global Economic Situation by Herwig Schlogl, Deputy Secretary General of the OECD. Dr Mamphela Ramphele, the Bank's Managing Director, through video conferencing, discussed The World Bank and the Knowledge Divide: Challenges and Opportunities. Pertinent questions followed which included the need to rethink intellectual property rights from the perspective of developing countries, tradeoffs between basic and higher education, the role of the Bank in promoting girls education, and restructuring the Bank to enable it to become a more effective knowledge institution. The participants urged the Bank to take on the role of a 'knowledge broker' helping countries to share knowledge from both south-south and north-south. This policy forum was a prime example.

Cross Country Sharing: Brazilian and Indian representatives were impressed by a Chinese presentation on knowledge inequality across Chinese provinces and were interested in doing similar analysis for their own countries. Chinese and Indians were impressed by the progress of Brazil on electronic government, and the Chinese in particular were interested in doing more in this area. Brazilians and Chinese were impressed by the Indian approach to validate and enhance
indigenous knowledge and said they would work this into their own strategies. Indians and Brazilians were impressed by China's sustained high rates of economic growth, by ambitious Chinese plans to increase higher education (to achieve 15% enrollment rates by 2005, from 11% currently) and by the fact that one third of higher education costs were financed by tuition charges to students. Brazilians were surprised to find out that the “Indian rate of GDP growth” had increased from 2 to 3% in the 1970s to 4% in the 1980s, to 6.5% in the 1990s (after 1991 policy reforms) and that they were aiming for 7.5 % in the next five years.

**Other Highlights:** The high quality of the participants' inputs, the cross country exchange, and the relevance and urgency of the issues discussed contributed to the strong outcomes. There was agreement on the critical importance of education, much more than on ICT. All three countries agreed on the critical importance of increasing access and quality to education and of using knowledge to address the problems of the poor. They also agreed that there was a real problem of a growing knowledge divide, not only with respect to the most developed economies, but also within their own countries.

**Country follow up:** The Chinese team plans to develop a full fledged knowledge strategy and is proposing an international seminar on this topic. India’s Planning Commission is going to incorporate findings from the forum into their plan on transforming India into a “super knowledge economy”. Several members of the Brazilian team are planning further follow ups, including the Ministry of Planning exploring with Finance, a white paper on the knowledge economy. The Indian team also proposed a Brazil-China-India electronic network. The three teams also met to discuss possible follow up cross country actions. (From mission report by Carl Dahlman, World Bank Institute.)

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**B. Sponsor A Knowledge Economy Forum for EU Accession Countries**

68. The Bank will sponsor a Knowledge Economy Forum in February 2002 with participation of ten EU accession countries. A previous draft of this report has been circulated to the ten countries, and reaction was sought in order to determine interest in the Forum. All intend to participate. Key partners (the European Commission, IBRD, EIB, Soros Open Society, representatives from OECD, and the governments of Ireland, Finland and Korea) will participate along with key non-government institutions in the client countries. These would include Universities, associations of private businesses engaged in knowledge intensive activities, local NGOs, etc. The outcome will be to engage country participants to prepare national knowledge economy strategies, and launch or strengthen critical programs which can already be identified. Many programs have already begun in the EU accession countries (as discussed above), so the forum may serve in some cases to mobilize outside support on ongoing programs.
C. Prepare National Knowledge Economy Strategies

69. What is a Knowledge Economy Strategy for an EU accession country likely to say and do? Firstly, it would situate the individual economy in the context of the global knowledge economy. The strategy would identify reforms and investments in education, information infrastructure, and R&D needed in order to adapt to and exploit these changes. The strategy would also indicate the macro policy prerequisites to the development of a knowledge economy.

70. Knowledge is best created, absorbed and disseminated in an economy which is open to trade and investment from outside. Like in OECD countries, openness will therefore be a key for the EU accession countries. Demand for knowledge is most likely to be great in a growing economy, where new investments and expansion of existing enterprises is underway. Competitive firms are more likely to demand knowledge, so good competition policy is also associated with the development of a knowledge economy.

71. The knowledge assessment might suggest alliances with world class universities, exchange of professors and students, joint research to tap into global research, ensuring harmonization with international standards. Government regulation is often found to stifle information sharing, so regulatory reform is likely to constitute a set of recommendations. There needs to be a legal and regulatory underpinning for free transfer and use of knowledge, and the protection of intellectual property rights. One chapter of an assessment would deal with “e-readiness” and other aspects of the digital divide. For example, it may be that the distribution of computers and internet connections in schools and public libraries can have a significant impact. One chapter would deal with the difficult issue of bringing agriculture and backward regions dependent on agriculture into the knowledge economy. Another Chapter will develop knowledge strategies for cities.

D. Creating Centers of Excellence

72. Another potential task would be to assist some accession countries to become “regional centers of excellence” similar to what is proposed under the Hungary Property Rights Initiative or under the Hungary InfoDev ICT Infrastructure and e-Readiness Facilitation Center. Slovenia is already in the process of establishing a center of excellence associated with public administration. Potential centers of excellence related to the Knowledge Economy that could be created in accession countries could be in the areas of: (i) Intellectual Property Rights (IPRs); (ii) e-commerce; (iii) e-learning (iv) entrepreneurship and venture capital.

73. In addition to assisting in the establishment of regional centers of excellence, the World Bank could serve as catalyzer in creating networks among the EU accession countries’ specific target groups, dealing with the production, transformation, and distribution of knowledge. A possible pilot could include the creation of a network among the accession countries’ e-Europe + 2003 implementing groups. Another proposed task could aim at strengthening the recently established Visegrad Four Countries’ “Knowledge-based Economy Working Group.”
E. Possible World Bank Financing of Projects Derived from Knowledge Economy Strategies

There are many project possibilities which may grow out of a knowledge assessment, in addition to assisting with the preparation of national knowledge economy strategies. An ambitious project financed by the Bank in Thailand is a good example (see box below).

<table>
<thead>
<tr>
<th>The World Bank’s Support for ICT Development in Thailand</th>
</tr>
</thead>
<tbody>
<tr>
<td>An $11.2 million project has been designed for Thailand to undertake the following:</td>
</tr>
<tr>
<td>1. A rural Information Technology innovation fund ($4.9 million) would provide grants to community groups for the development of internet content for community needs. It would provide training to users in basic applications. Content would be developed by soliciting the input of community representatives and showing them content options.</td>
</tr>
<tr>
<td>2. An Information Technology (IT) access component ($5.6 million) would provide a facility through which private IT firms would be competitively contracted to establish private tele-centers. Tele-centers would contain computers, telephone and internet access. Beneficiaries would be rural communities which have been awarded innovation fund grants.</td>
</tr>
<tr>
<td>3. The digital awareness and literacy component ($0.44 m) would provide public education about computers and internet and the basics of computer operation.</td>
</tr>
<tr>
<td>4. A project administration and promotion component ($0.22 m) would finance start-up, investment and operating costs of a project implementation and evaluation unit. It would design and manage project activities.</td>
</tr>
</tbody>
</table>

In addition, an E-government project is being prepared for Thailand. It would build the capacity of the national information technology committee for policy management, legal development, project prioritization, and promoting awareness and knowledge within the public and private sector about IT and about knowledge based approaches to development. It would also include IT for decentralized administration and public sector reform. IT solutions would be developed for resource mobilization and allocation decisions, public service delivery, and transparency of public decisions. On line corporate licensing would be developed. Barriers to the development of e-commerce and supply chain management using the internet are being investigated. A Thai E-Commerce Institute may be established to facilitate this development. A technology development fund is being considered to finance on a matching grant basis technology development costs in key sectors such as software development.
Other possibilities include telecommunications sector reform, reform of institutions involved in research and development, regulatory reform, education reform, agricultural research and extension, or policy reform with an important knowledge element.

F. **Elaboration of the Urban-Knowledge Economy Program**

75. The urban strategy is in a very preliminary stage. One proposal is to place special effort on assisting several countries to develop city-based knowledge economy strategies. The cities chosen would be those which (i) are progressive and reform-minded; (ii) see strong value-added to developing knowledge economy activities; and (iii) have a vision of the types of programs that they are developing at the city level that can mesh well with what is underway in the area of knowledge economy activities at the national level. Hungary, Poland, Lithuania, Bulgaria and Romania contain cities which are either already making good use of KE activities or are at the beginning of such programs, but wish to develop and expand them in future.

76. Four cities in the EU Accession countries could form a first group to obtain World Bank assistance to Knowledge Economy work:

- Poznan, Poland; Tatabanya, Hungary; Vilnius, Lithuania; and Sofia, Bulgaria.

The knowledge economy program could be sequenced as follows:

**Stage 1:** Discussion with city officials to identify the areas of key priority for them to enhance participation in the knowledge economy.

**Stage 2:** Elaboration a program of improved knowledge economy for each city.

**Stage 3:** Linking the city into useful networks that currently operate in Europe and North America.

77. A program supported by the World Bank could include developing well-functioning portals and other IT communication infrastructure, help desk functions, and improved use of city resources such as libraries and educational establishments. Knowledge economy activities would also need to be geared to fostering open communications with urban stakeholders in town hall meetings.
## Annex A

### Urban Knowledge Economy

**Mobilizing knowledge for Development in EU Cities**

**Review of Knowledge Economy Factors** (Work in progress)

<table>
<thead>
<tr>
<th>Cities</th>
<th>International Alliance</th>
<th>Interregional Interactions</th>
<th>Civic Engagement and Mobilization</th>
<th>Availability of Local Information</th>
<th>Availability of Investment Opportunities</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Poznan, Poland</strong></td>
<td>Member of Cities of Change Program (a network of 10 cities in Central and East Europe) to promote a global showcase of providing access to international expertise and knowledge, promote democracy and efficiency in local governments.</td>
<td>Through the website, Poznan tries to offer favorable interregional economic conditions and outstanding institutional support system for business established by the municipality.</td>
<td></td>
<td>Poznan website offers very favorable economic conditions and an outstanding institutional support system for business established by the municipality.</td>
<td>Poznan’s Capital Investment Program is shown, including the city’s long term investment planning, its function in the strategic city planning and the internal organization of the planning process through interdepartmental co-operation</td>
</tr>
<tr>
<td><strong>Sofia, Bulgaria</strong></td>
<td>City carries out a City Development Strategy (CDS) exercise supported by the Cities Alliance (a global alliance of cities and their development partners committed to improve the living conditions of the urban poor).</td>
<td></td>
<td>Sofia website comprises rich information about culture, media, transport and tourism, but none on e-governance.</td>
<td>In a process of privatization and economic adjustment towards EU accession and, as a consequence, with companies more oriented towards the increase of productivity, the challenge of Sofia will be the restructuring and modernization of the industry and service sector, and the upgrading of infrastructure, as a way to attract investment, and establish a solid base for economic development.</td>
<td></td>
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</tbody>
</table>
| **Vilnius, Lithuania** | Member of the Union of the Baltic Cities.                                                | The city is situated in the center and cross-roads of Europe                               | The city is the center of culture and politics.                                                   | The city is center of business; Vilnius attracts more than half of all foreign direct investment coming to Lithuania. | Website includes several investment opportunities and reads: “Vilnius is calling for creation and development of businesses. We shall do our best to ensure stable and business-friendly environment”.  
The aim is to turn Vilnius, into the center of business and cultural tourism, the point for meeting and co-operation of East and West. |
| City has active website | Associated members of the EUROCITIES.                                                  |                                                                                           |                                                                                                  |                                                                                                   |                                                                                                   |
| Population: 578,300    | Member of the European Cities Against Drugs Association.                                |                                                                                           |                                                                                                  |                                                                                                   |                                                                                                   |
| Mayor would be very interested to participate in a KE program         | Old Town included in UNESCO.                                                            |                                                                                           |                                                                                                  |                                                                                                   |                                                                                                   |
| City has active website  | Listed in World Heritage.                                                              |                                                                                           |                                                                                                  |                                                                                                   |                                                                                                   |
|                        | Twin with 13 cities in Europe Asia and USA.                                             |                                                                                           |                                                                                                  |                                                                                                   |                                                                                                   |
|                        | Cooperation agreement with 15 cities.                                                   |                                                                                           |                                                                                                  |                                                                                                   |                                                                                                   |
| **Tatabanya, Hungary**  | In order to find an appropriate and applicable framework for sustainable development, Tatabanya joined the Cities of Change Network. Network members can exchange experiences at an international level and access an extensive knowledge base. | Due to its favorable location and coal resources, the small mining town fast developed into one of Hungary’s significant heavy industrial centers during the 1940s. Following the socioeconomic transition of the 1990s, most of the industrial plants shut down and people faced high unemployment. | The new city management decided to turn “the closing down” Tatabanya into a prosperous town of healthy and wealthy citizens by creating new jobs in a liveable environment. | Changes in organizational structure and policies were initiated along with innovative procedures in the city council and its administration. | By the mid-1990s an economic development strategy was prepared. As a result, new industries were created, which generated a dramatic decrease in unemployment. During the next phase of development the city hopes to attract more advanced industries such as research and development. |
| Population: 72,000     |                                                                                         |                                                                                           |                                                                                                  |                                                                                                   |                                                                                                   |
|                        |                                                                                         | Due to its favorable location and coal resources, the small mining town fast developed into one of Hungary’s significant heavy industrial centers during the 1940s. Following the socioeconomic transition of the 1990s, most of the industrial plants shut down and people faced high unemployment. |                                                                                                  |                                                                                                   |                                                                                                   |
|                        |                                                                                         |                                                                                           |                                                                                                  |                                                                                                   |                                                                                                   |

Note: This table is work in progress; details on cities are to be completed.
Annex B

Selected Webography

1. Website for “Hidden Challenges to Education Systems in Transition Economies” 2000, The World Bank:
   http://Inweb18.worldbank.org/eca/eca.nsf/Attachments/Hidden+Challenges+to+Educatio
n/$File/ECA.layout.pdf

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