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The IPTS REPORT

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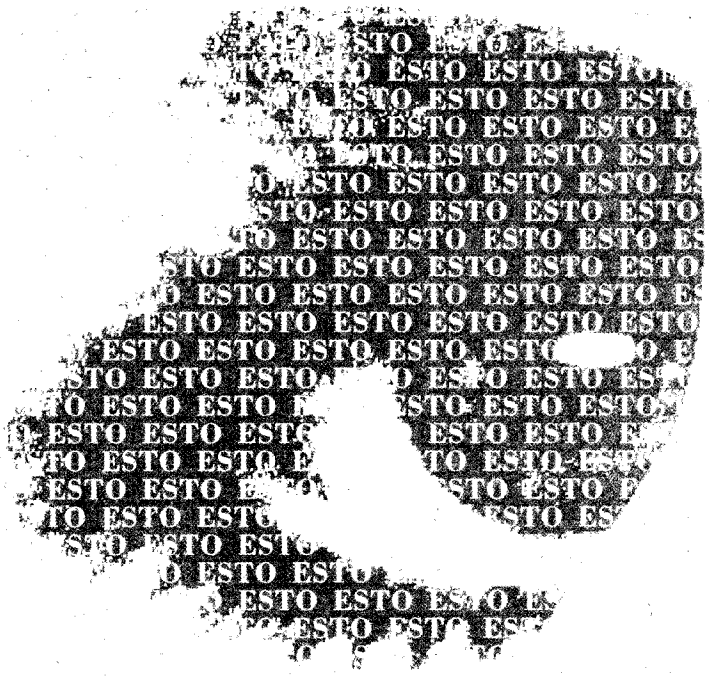

SPECIAL ISSUE: THE INFORMATION SOCIETY AND EU ENLARGEMENT

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PREFACE

The acceding and candidate countries, in particular those in Central and Eastern Europe, have during the last decade undergone a set of three radical transformations: the shift to a market economy, integration into the European Union – the so-called Enlargement Process - and finally, a move towards the Information Society, today enshrined in the different initiatives of the eEurope Action Plans.

These three transformations aim, at various levels, at the emergence of an enlarged European knowledge society as referred to in the March 2000 declaration of the Lisbon Council[1]. In doing so, they challenge the economy, institutional and political structures, constitutional and legal frameworks, and working conditions in the countries in question.

The question of what the Information Society means for countries entering the European Union from next year onwards is a fascinating and complex one. Fascinating, because it opens up a real window of opportunity for these countries to leapfrog technical, economic and social divides, thereby enabling them to meet the Lisbon objectives by 2010. Complex, because building the Information Society is only one of many priorities these countries have today and because there is no single recipe for achieving it. The research carried out into these issues at IPTS and reported herein has attempted to break down this complex picture into the following straightforward questions:

- *Have we learnt anything from the experience of the EU-15 Member States that is transferable to the CC-13? Does industrial development of the ICT sector constitute a major opportunity for the acceding and candidate countries?*
- *How best can use be made of the benchmarking efforts of the eEurope+ Action Plan? To what extent do these tools fit methodologically into the context and the issues to be analysed in acceding and candidate countries? How can an Enlarged Europe benefit from "bench-learning" tools?*

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CONTENTS

Special Issue: The Information Society and EU Enlargement

- to catch up in technological terms, but not necessarily by taking advantage of technological leapfrogging opportunities – such as with say third generation mobile networks – this is not so straightforward;
- to match or even challenge western standards in the area of technological education, bearing in mind that the transition to market economies has temporarily weakened the economics of the educational system (with a consequent need for strengthening it during the coming decade), and that the continuing high demand for ICTs might reveal skills shortages in certain sectors such as public administration, SMEs, etc.
- to develop numerous content-related initiatives in media, e-business and e-government, but recognizing the particular context and challenges that will make this a more difficult exercise than in the case of the EU-15 countries;
- to attract existing global companies, in particular those in the ICT sector, but with attendant risk of their plants relocating to other trade blocks, ironically in the face of increasing economic growth in candidate countries.

As a result, a simple scenario for the way forward, a single and common Information Society strategy for the candidate countries, appears an unlikely outcome. The recipe which made an economic success of certain regions and countries in EU-15 seems almost impossible to repeat in the candidate countries.

First and probably most important, candidate countries already confront difficult choices, expressed in one paper as that between "bread or broadband". Only even-handed trajectories that will offer a compromise between these two poles, and feed simultaneously into overall welfare issues *and* economic growth will be politically sustainable. Technology is perceived as unaffordable, unless it can be demonstrated to be a clear tool for the country's well-being. The strong disparities that accompany the enlargement process at the European level, and the potential complex digital divide that may derive from these disparities are illustrations of this dilemma. Moreover, many countries may need institutional and managerial strengthening rather than plain infrastructure or technological upgrading. The question is therefore how best to put the Information Society policy strategies at the service of a country's democratic and social development, while optimizing its resources and economic output.

Second, while the example of west European countries could be seen as showing the way forward, the simple emulation of those "best practices" is seen as decreasingly relevant for candidate countries. In particular, Information Society developments should not be seen exclusively as targeted industrial developments around the ICT sector itself. While this has been a possible trajectory for so-called "Tiger" countries of the EU-15 during the last decade, today's economic conditions – the burst of the speculative bubble around the new economy, and the overall downturn of the global economy – do not seem to favour such scenarios any longer. In the realm of a strongly competitive and global industry, it is obvious that not everybody can play a major role. Moreover, current market developments are bringing uncertainties to the future of the ICT industry, even in EU-15 countries or regions. "*Benchlearning*" from EU-15 successes and failures is making the best possible use, not only of the accumulated European knowledge base, but also of Asian, US and developing countries' experiences.

Third, ICTs are tools for the modernization of the economy, and for the building of an equitable, democratic and sustainable society. Just as in most advanced economies, growth in the enlargement countries is expected to come from productivity gains in ICT user-intensive sectors – at present these being expected to be mainly in retail and wholesale, banking and insurance, etc. – rather

ings allowing for such processes to develop are a core lesson of EU-15 experience: there is a role to play in each specific context for a variety of actors from national politicians to industrialists, unions or NGOs. Bottom-up strategies are needed and should be put in place whenever possible.

Finally, following the terms of the Lisbon objectives, there is an essential issue about integrating Information Society Strategies in the broader development of a Knowledge-based society, seen as the broad orientation of Europe's contemporary development trajectory. In such frame, ICTs are seen much more as enablers for economic, political, social and intellectual development, rather than self-sufficient goals.

The studies illustrated in this special issue are therefore part of a larger picture taking in strands of economic development resulting from technological change. Along with the Information Society issues described herein, the *IPTS Enlargement Project* addresses the agricultural transition to be made by the acceding and candidate countries and the question of how sustainability in the areas of energy, waste management and transport can be achieved when economies are growing. The Project assesses how technological change in these areas affects overall productivity and competitiveness under different policy scenarios.

The Enlargement Project is being carried out jointly with scientists and experts from the countries concerned, and is guided by a Steering Committee made up of high-level representatives from all ten acceding countries. The results are to be discussed in a forthcoming conference in Florence in November 2003, co-organized by the JRC-IPTS and the European University Institute, and part of the official programme of the Italian Presidency. The conference will bring together European academic researchers and policy-makers to debate the issues involved and their implications for future policy.

Notes

1. European Commission, Report to the Spring European Council on the Lisbon Strategy, Brussels, 21 March 2003, COM(2003)5.
2. European Commission, 2002. Industrial Policy in an Enlarged Europe. Communication from the Commission. COM(2002) 714 Final. Brussels, December 2002.

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wed the CCs to catch up in technological terms and to achieve above EU-15 average penetration rates. In some countries (the Czech Republic, Estonia, Hungary, Slovakia, Slovenia and Turkey) fixed line penetration has overtaken that of the EU-15. However, as progress in ICT penetration is correlated to a large extent with the level of economic development, the investment capacity and the purchasing power of the population, countries with low per capita GDP are not capable of sustaining such a high rate of penetration growth. On average, the CCs continue to lag behind EU Member States in most, if not all, measures of ICT access and usage. Furthermore, the overall economic situation in the CCs – and the resulting uneven revenue distribution - is widening the gap between the people and organizations that can access advanced technologies and services and those for whom they are a luxury.

Close observation of the educational system also shows that CCs at least match Western European standards in technological education. This is an asset clearly inherited from the past institutional settings in the educational area, and current changes – privatization, shifts in the vocational and on-the-job training system, brain drain, public funding crises, etc. – may offer opportunities as well as weakening the inherited system.

Such achievements, some of which are very recent, should also be assessed in the light of the disparities on many levels that can be observed within the CCs and in a broader Enlarged Europe. With enlargement it is estimated that the income dispersion between regions in EU-28 will double relative to that existing in the current EU-15.[2] The impact and complexity of the digital divide resulting from this fact, added to disparities between countries in terms of the distribution between their rural and urban populations, regional situations and demographic trends, is expected to be such that it could endanger market growth, social cohesion and democratic participation. In such circumstances, there is a very high risk of developing a complex digital divide between and within groups of European countries, among sectors and businesses, generations and cultures, etc. Such a pronounced divide would weaken the economy, social cohesion and the building of democracy in the CCs, and would run counter to the European objective of an inclusive society.

Finally, most of the CCs today are new democracies with comparatively weak economies and are still dealing with the overall challenges of the transition to market economies, and the implementation of the political and economic framework required by the European Union.[3] Striking a balance between two sets of policy objectives - acute societal day-to-day needs and longer term IS-related development needs - is probably their most difficult policy challenge.

From this point of view, it is clear that the strategic political choices made today could have important implications for the CCs' economies and societies:

- If present development imbalances are not properly addressed and provisional achievements not consolidated, the CCs will certainly succeed in creating ICT islands but large disparities between countries, regions, businesses and populations will remain, both in the ICT domain and others. CCs run the risk of not reaping the political, social and economic benefits of their societies' transformation. Economically speaking, these countries may even become isolated in the role of low wage/low quality countries constrained to lower added-value production and consumption patterns.
- If the CCs wish to achieve a more balanced development of the Information Society and strengthen their position, a strong policy commitment (policy push) is needed which clearly focuses on meeting the Lisbon competitiveness,

The disparities within the CCs and in the broader Enlarged Europe risk endangering market growth, social cohesion and democratic participation

The strategic political choices made today could have important implications for the CCs' economies and societies

synergies that may help to create common goals and trajectories for all. The concept calls for innovative institutional arrangements in public-policy management, which include the delegation of decision making and implementation capacity, and a citizen/entrepreneur-oriented mindset. It promotes the idea that reciprocal responsibilities pay better than a "winner takes all" approach. Coordinating co-opetition involves meeting the challenge of difficult 'policy learning', in particular because the environment for policy-makers and partner-actors becomes highly complex and constraining.

EU policies can play a powerful role in framing these political conditions. In most cases they have supported national initiatives as much with mandatory regulation frameworks as with awareness raising, direct subsidies or benchmarking initiatives. However, EU policies can have the opposite effect. The focus on EMU and the stability pact, and on the overall enlargement process and its conditions, may have distracted some governments from other priorities or legitimized less open cooperative schemes.

As well as the right political conditions, IS initiatives need financial support that offers a variety of tools adapted to the diversity of initiatives necessary to explore and develop traditional and new opportunities – with very different degrees of risk - for business and civic life. Foreign Direct Investment (FDI) is a major tool, particularly for funding and developing an ICT (manufacturing) sector, but also for any development plan. Other essential tools for the promotion of domestic ICT-related development are venture capital, seed capital, public subsidies and the protection of revenues through adequate regulation (for example, intellectual property rights).

The EU-15 case studies also show that the presence of foreign and indigenous ICT manufacturing multinationals and/or a dynamic SME-sector that successfully develops international ICT-related niche-markets (such as software development, maintenance, services, etc.) have been essential ingredients in some major IS developments. During the second half of the 1990s several national economies benefited from the contribution of ICT industries to added value, GDP and employment. But it is also evident – if not more important – that national/regional economic structure matters, as much for development opportunities as for growth. Countries and regions, which have a tradition in industrial manufacturing, may succeed in modernizing that industry through ICT use. The adaptive use of ICTs is at the core of these IS strategies. But other nationally or regionally specific assets – particularly in services – can help to transform relevant sectors into ICT-intensive ones. Exploring, creating and exploiting these 'sweet spots', which may be either historical or new, is a complementary strategy which may be more reliable in the long term than a basic industrial policy that concentrates on ICT manufacturing clusters.

More surprisingly, geographical position or size may allow for a specific role in geopolitics or international trade. Traditional migration flows may reveal unexplored networking capacities as well as access to foreign resources. Language specificity may translate into market access or identity seeking. The historical background may support sudden attractiveness. Such features can be embedded in international alliances, in marketing behaviours and mobilizing visions or in the distribution of managerial responsibilities. Strategic creativity matters more than the hurdles. Addressing those specific features that are seemingly hurdles to ICT-related development at national or regional level has often revealed opportunities for creating competitive advantages. Not addressing them has turned them into real weaknesses.

Finally, education – often little acknowledged in excessively short-term assessments – is always

In most cases EU policies have supported national initiatives as much with mandatory regulation frameworks as with awareness raising, direct subsidies or benchmarking initiatives

During the second half of the 1990s several national economies benefited from the contribution of ICT industries to added value, GDP and employment

It is thus quite possible that times have changed for national Information Society projects relying strongly on the building block of growth in ICT manufacturing industries. This issue affects the transferability of the observed factors determining success and failure, into the context of the CCs and more precisely to the support given to their ICT Manufacturing industries.

Potential CCS "Tigers": repeatable trajectories towards the IS?

The above observations question to what degree "Tigers" scenarios are possible for some or all of the CCs? Do their ICT industries show signs of being able to reproduce a "Tiger" renaissance or not?

A closer look at the ICT manufacturing industry in those CCs which are seen as ICT manufacturing champions today - namely Hungary, Poland, the Czech Republic, Estonia, Turkey – indicates some specific weaknesses which may have a negative effect on their development in the medium term:

- The development of their ICT manufacturing capacity is highly dependent on external factors. For example, fluctuating FDI flows and their relation to incentive policies have a considerable influence. Foreign firms, whose strategies are designed to deal with an ultra-competitive environment may also decide that relocation of activity is the easiest option. Competition from other European and non-European countries, access to market-based competition for plant and R&D centres, and strong dependency on overall economic health as export-oriented industries also have an effect.
- There is an observable shift in production specialization towards lower-value ICT manufacturing such as Consumer Electronics (which represent today less than 10% of total world production value) or even Components. This shift accompanies a general shift towards assembling activities with low added value and little accompanying knowledge intensive activity (R&D, for example). This has happened partly as a result of a focus on competition strategies that are cost-based rather than knowledge-based.
- Those CCs that are seen as ICT manufacturing champions – with the exception of Hungary – have negative overall trade balances in ICT goods. Even though they have stronger ICT manufacturing industries than the other CCs, their economies have to absorb the effects of a much larger demand.
- Last but not least, it may well be that these strategies, and the industries themselves, will be sensitive to the potential impacts of accession. While the single market rules will further boost export capabilities as the logistics of doing business are made easier, it may well be that some aspects of today's policies will come under scrutiny in order to make them meet fair competition rules. Excessively generous incentive policies, for example, may be cut back.

Bearing these factors and the most recent company decisions (to relocate to Asia, for example) in mind, it is fair to conclude that developing "classical" Tiger strategies by encouraging foreign or domestic companies to foster and grow in the domain of ICT manufacturing may be, today, a mistake. Though these strategies were rewarding in the 90s, today the position of western European "Tigers" – Ireland, Finland, Sweden – has been weakened not only by the downturn of the market and the difficulties in the telecoms sector, but even more by the pervasive trend of globalization and one of its obvious consequences: the rise of the Asian countries as both major economic partners and challengers. The timing now after two decades of progressive globalization may thus play against new entrances in terms of industrial scenarios.

The "European Tigers" are models that CCs with strong ICT manufacturing sectors might wish to emulate, although there appear to be some specific weaknesses which may have a negative effect on their ability to do so in the medium term

With the exception of Hungary, even the CCs that are seen as ICT manufacturing champions have negative overall trade balances in ICT goods

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* note that most of these references are available online at **http://fiste.jrc.es/**

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- Can lessons be learnt for other sectors' e-services in the CCs?
- What are the potential private/public policy options to address these specific issues?

Internet banking services supply

Internet banking is one of a variety of remote distribution channels that banks have deployed over the last 20 years as a way of providing services to their customers away from bank branches. These alternatives are shown schematically in Figure 1. Phone banking, electronic payment debit, credit and electronic purse cards, cash machines (ATMs), bank kiosk machines, PC banking, Internet banking, mobile banking using mobile phones and PDAs (Personal Digital Assistants) and interactive Digital TV banking are examples of the multitude of channels and technologies used. Among the different delivery channels, Internet banking, a content based secure application based on the open information Internet infrastructure, has the most similarities with other IS services infrastructure and is the target research application here.

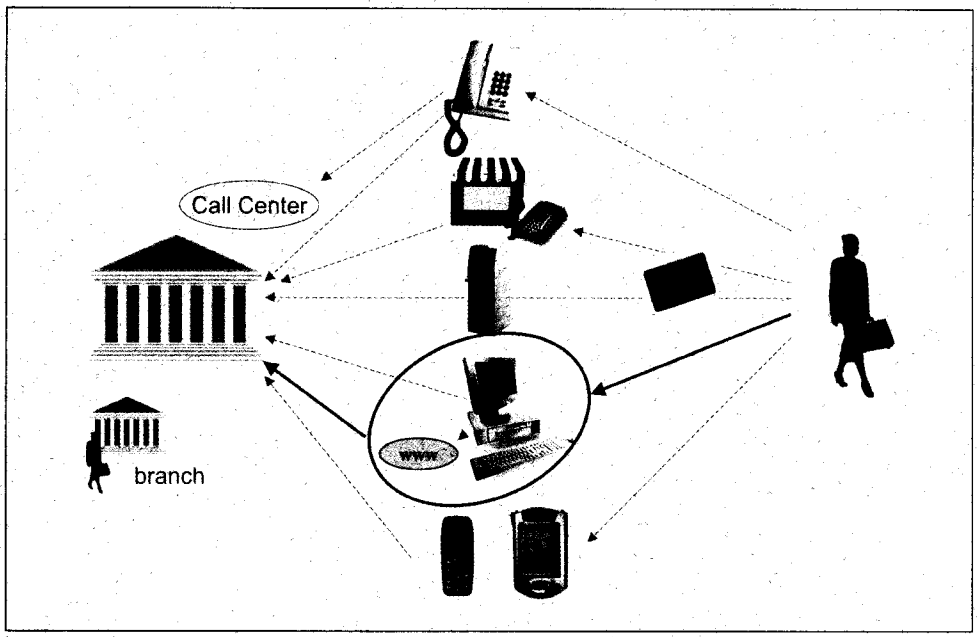
The functions provided by banks over the Internet have evolved from allowing customers to consult their accounts to providing a full range of banking services. In the most developed applications, the Internet can be used to access almost the whole range of services available at branches or by phone. In addition to offering nearly all "branch-based" services, the technology allows banks to offer new added value services only available on-line such as personalized financial information menus, e-mail alerts, electronic commerce, real-time share trading and 3rd party services such as the management of utility bills and tax payments.

The banks' motivations for offering Internet banking have mainly been increasing cost-effectiveness, extending customer reach, and retaining market share. Estimates for the cost of transactions using the various channels (e.g. physical branches, phone, ATMs, PC-based dial-up access) show Internet transactions to be the cheapest with a ratio of 1-2:100 compared to physical branches, 1-2:30 compared to ATMs and 1:2-10 compared to PC-based dial-up banking (BIS, 2001).

Internet banking is one of a variety of remote distribution channels that banks have deployed over the last 20 years as a way of providing services to their customers away from bank branches

In addition to offering almost the full range of "branch-based" services, the Internet channel allows banks to offer new added value services only available on-line, such as personalized financial information menus, e-mail alerts, electronic commerce, real-time share trading etc.

Figure 1. Banking distribution channels



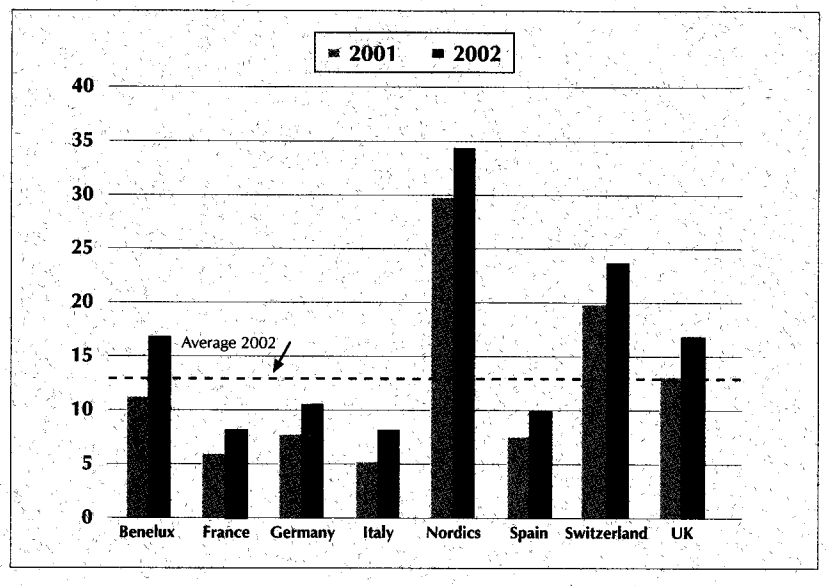
An analysis of user profiles and usage patterns suggests that Internet banking is no longer the preserve of the "early adopters" but has moved into the mainstream digital mass market. Moreover this trend is expected to continue. The most frequently used services are those that provide financial information (account information, loan and insurance rates, investment reports and advice). Other heavily used services are simple transactions such as paying bills and transferring money. Finally, the number of users of on-line trading functions and investment research and advice is expected to remain limited (Datamonitor, 2002; Bank of Korea, 2002; Fundación Auna, 2002). There seems also to be an evolution in usage patterns from more consultative functions towards more transactional ones, which seems to indicate users' trust in Internet banking is increasing over time.

The analysis of Internet Banking penetration levels across countries shows that there is a significant country-to-country variation, with differences not clearly related to each country's level of economic development, as illustrated in Figure 2. The Figure also illustrates the leadership of European countries, with Norway and Finland having the highest penetration rates world-wide - around 40% - among bank customers, followed by South Korea, with the US and Japan lagging behind.

Internet banking penetration estimates for Europe in 2002 vary from 25 to 54 million users (Forrester, Datamonitor, Jupiter), and 39% of Internet users (Jupiter), with huge northern – southern country variances, as illustrated below (Fig. 3). In the same Figure, significant growth in 2002/2001 can also be observed. In the CCs, the average penetration of Internet banking (I-banking) is very low and far behind that in the EU-15, despite the fact that all the major banks offer the service. Huge variations between the CCs are also reported, as illustrated in Figure 4, with Estonia at the top with 18-25% of the population using I-banking.

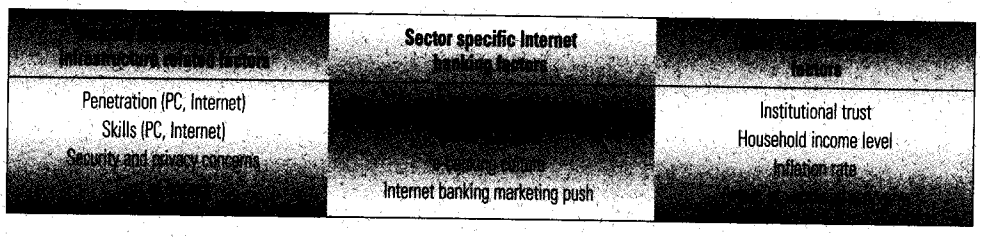
The data show considerable variations between countries in terms of the adoption of Internet banking. The differences between the CCs are even greater than those between the EU-15

Figure 3. European Internet Banking customer uptake (% of population)



Source: Datamonitor, Sep 2002; Population: Eurostat (1.1.2002), World Bank (2001) for non EU-15 countries. Note: Missing EU-15 countries: Austria, Greece, Ireland and Portugal.

Table 1. Classification of Internet banking adoption factors



In relation to **sector specific factors**, interesting findings are:

- A strong correlation between the banking culture (referring to which and how banking services are used) and particularly, the percentage of people with a bank account, and the development and adoption of Internet banking services could be expected.
- The concept of an e-banking culture refers to the range of e-services offered by the banks and the level of usage by the consumers, or their habits, where time plays an important role. E-service examples are Automated Teller Machine (ATM) networks and cards for cash withdrawal and banking services, Point Of Sale (POS) networks and cards for e-payments, phone banking, PC banking and more recently Internet banking. The observation of countries with strong e-services penetration (Finland, Estonia, South Korea) points at a potential relationship between a strong penetration and usage of electronic delivery channels, and the faster and higher adoption of Internet banking.
- Usage levels seem also to depend heavily on bank marketing policies aimed at stimulating the use of electronic channels.
- Finally, cultural values such as the importance of direct inter-personal relation also play a role in the definition of the e-banking culture (ePSO, 2002; Praxis Emor, 2002).

Other **socio-economic context specific factors**, although not studied in the analysis, are likely to influence both the degree of usage of banking services and the adoption of Internet banking, such as: trust in institutions, household income level, the inflation rate and the extent of the unofficial economy (which may obviously discourage bank use among certain sectors).

This analysis shows that the fact that banks offer Internet banking is not sufficient, on its own, to ensure adoption. A number of further factors influence demand. Access infrastructure to the service is a prerequisite and also time and trust are needed to convert consumers to the use of e-delivery channels, of which Internet is one. Internet penetration is even regarded as having a strong "pull" influence in supply/demand dynamics, stronger than bank's "push" strategies. This is confirmed by the analysis of success stories which show that the existence of PC/Internet penetration together with a strong banking push of e-banking services in general, and Internet banking in particular, create favourable conditions for a faster and wider adoption of Internet banking.

Key issues in the CCs for the adoption of Internet banking

The analysis of the factors in the adoption of Internet banking point to a number of potentially significant barriers in the CCs:

- Limited PC/Internet penetration in general, and particularly at home,
- Consumer security and privacy concerns, potentially aggravated by the post-September 11 scenario,
- Application specific barriers.

The fact that banks offer Internet banking services is not sufficient to ensure adoption. Access to infrastructure, and the degree of trust consumers have in e-delivery channels are also important

than 7% of the Internet connections in CCs (IDC, 2002; EITO, 2002; eEurope+, 2002).

Therefore, the low PC and Internet penetration in general, particularly at home, limited by the access charges and the high cost of PCs, the low level of fixed-line penetration, and low penetration of alternative access technologies, may represent a potential bottleneck for short to medium term Internet and Internet banking development in the CCs.

Consumer security and privacy concerns

Several banks in the CCs reportedly consider security and privacy concerns to be major barriers for the development of Internet banking (Hansabank, Erste Bank, Bank of Valletta). Consumer security concerns may be justified, following the increasing levels of cybercrime and identity theft.

In relation to privacy concerns, even before September 11, citizens' concerns regarding the protection of their personal data were reported to be a potential bottleneck in the development of the IS (IPTS, 2001). Mistrust in ICT based communication/transactions, which can be seen as potential tracing or profiling tools is reported as a serious potential obstacle to e-commerce in CCs (Gourova et al., 2002). Furthermore, a post-September 11 scenario, with increasing power by authorities to monitor communications traffic, may worsen the situation increasing privacy concerns, potentially accentuating the lack of institutional trust. Privacy concerns may be amplified in a society which has lower trust in institutions and is more sensitive to the risks of an Orwellian world.

Application specific barriers

Additional sector specific barriers that could limit the potential and the pace of development growth of Internet banking in the short-medium term are the lower degree of trust in banking institutions, the lower development and use of financial services, as illustrated in Figure 5, and the lower development of e-banking culture (with higher cash in circulation, lower number of cashless transactions and lower number of ATM transactions) except in Estonia, Slovenia and Malta (ECB, 2002).

Potential role of private and public sectors and policy options

Both the provision and adoption of e-services are key components for the development of the Information Society (IS). Adoption of e-services in Candidate Countries (CCs) is reported to be low, with some exceptions such as Estonia. Retail Internet banking is one of the most developed e-services in CCs. The analysis of the supply and demand dynamics reveals the importance of demand, influenced by a number of context-specific as well as sector-specific factors. Those drivers and barriers for the adoption of Internet banking are likely to have relevance to other segments (e-government, e-administration, e-health) of the services in the IS.

Potential policy actions in the area of Internet infrastructure and access technology could aim at reducing barriers and stimulating the use of Internet in general. Potential policy options could be:

- Governments may take actions to stimulate the spread of fixed line telephone access;
- Private-public cooperation could address the promotion of research, development, standardization and deployment of emerging alternative PC based Internet access technologies such as (broadband DSL, CATV and Fixed Wireless Access);
- Public-private partnerships could take the form of actions to stimulate the demand including the increase of PC and Internet penetration and education at schools at different education

Other sector specific barriers that could slow the pace of development growth of Internet banking are the lower trust in banking institutions and the lesser extent to which financial services are used

The drivers and barriers for the adoption of Internet banking are likely to have relevance to other segments of the services in the information society

Keywords

candidate countries, Internet banking, Internet banking adoption factors, Internet access, security, privacy, trust

Note

1. Methodological note: This study has mainly been carried out through desk research. The lack of available public and official data on Internet banking services and their adoption by the consumer is general in the EU15, and accentuated for Candidate Countries, where Internet banking is less developed. The author's compilation of data both for the EU15 and CCs is based on a diversity of mostly non-official sources (consulting and market research companies, banks' web sites and own press releases) and is incomplete and sometimes somewhat disjointed. Data on a selection of individual countries and banks has been complemented with individual questionnaires and interviews (see Acknowledgements section). Therefore, data provided in this report should be read as indicative and be interpreted with reservations.

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the existing income gap between the CCs and the EU average requires high growth rates to which ICT sectors should be able to make a contribution.

This article sets out to present some links between ICTs and economic growth in the candidate countries, presenting the (unclear) evidence, the policy problems and the areas of future research. The first part of this report gives a brief overview of the major studies and evidence describing the links between ICT-sectors and productivity and economic growth. The second part describes why the contribution of ICT to economic growth in candidate countries is poorly measured. The third part makes some tentative lessons and policy recommendations for the governments in order to strengthen the links between ICT and economic growth. Finally, the study concludes by the need to start a more comprehensive and broad-based research policy on the links between ICT sectors and productivity and economic growth in the 13 candidate countries (CC-13).

The impact of ICT on productivity and economic growth in the literature

Several studies have assessed the impacts of information and communication technologies (ICT) on productivity growth during the 1990s. For the United States, there is widespread agreement that the expansion of ICT goods strongly accelerated productivity growth in the 90s, when most of the growth in the economy came from high-tech sectors. In Europe, ICT investments have also accelerated output growth, but they have not exploited the productivity enhancing potentials to the same extent as in the United States.

While ICT investment increased in most OECD countries, its impact on growth differed widely. According to OECD (2001) ICT investments accounted for 0.3- 0.9 percentage points of growth in GDP per capita between 1995 and 2000 with the United States, Australia and Finland being close to the upper limit and Japan, Germany, France and Italy to the lower level. The increased use of ICT changed not only the flow but also the stock figures as the shift in investment towards ICT has increased the share of assets with higher marginal product of capital within the capital stock possibly leading to an improvement in the overall quality of the capital stock (Scarpetta et al., 2000).

The use of ICTs in the production process has been one of the main driving factors of growth and its positive contribution to it, mostly in high-tech sectors. Certain services which use ICTs, such as the wholesale and retail trade, have also experienced above-average increases in productivity growth in recent years (Stiroh, 2001), although not as high as in high-tech sectors. One has additionally to take in account that productivity growth in services had been quite low on average since the 70s. Therefore there still is a lot of debate on the effective conclusions to draw about ICTs' impacts on services productivity (See i.e. Jorgerson's publications in 2002 on the subject). For many economists the potential impacts of ICTs on productivity in the services sector are still a matter for further research. Secondly, ICTs could also improve the overall efficiency of capital and labour, but here the doubts were raised also for the USA about the functioning of this relationship (Gordon, 2000). Thirdly, according to the OECD, countries that underwent more rapid diffusion of ICTs experienced more rapid productivity growth in the 1990s than countries where ICT diffusion was slower.

While there is a broad consensus on the beneficial effects of ICTs on economic growth, particularly in high-tech sectors in advanced countries, views on the links in middle-income countries are much less clear cut. Results of some empirical studies on the returns of IT investments in countries with various levels of development show that these returns are generally positive and significant for

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While there is a broad consensus on the beneficial effects of ICTs on economic growth particularly in high-tech sectors in advanced countries, views on the links in middle-income countries are much less clear cut

The precise determination of the contribution of ICTs to productivity and growth in the candidate countries is also hampered by various statistical and measurement problems. Some of them are related to the availability and quality of data: the transition to a market economy has also affected statistics, and data collection has suffered a lot in recent years. As a result of structural changes, it is almost impossible to have long-term series as the sectors and the market agents within them differ currently from their structure 5-8 years ago. The level of sectoral data availability is also very low both in relation to flow and stock data. For example, the absence of high quality and reliable data on capital stocks is a key problem, but investment figures are also problematic. This makes it extremely difficult to break down economic growth into the contribution of the individual factors, including the factors of production and TFP, as data are hardly available even for broad sectors and do not address the manufacturing industries in more detail.

Besides transition-specific statistical problems, general measurement problems of output, including new products and quality changes are quite similar to those in advanced countries. These problems are even more acute in candidate counties as the explosive growth of services makes them an increasingly important source of growth and thus increases the problems related to the determination of productivity growth in the 'unmeasurable sectors'. This may create concerns as to whether the productivity performance of services is accurately estimated, or that their contribution is being underestimated due to the long-lasting unmeasured effect of ICT on productivity performance, particularly in ICT-using services, like banking and finance.

Finally, one can also mention the problem of using appropriate price indices to measure real output changes: lack of appropriately disaggregated data as well as the need to use so-called "hedonic" statistics[3] makes it difficult to compare the countries among themselves and with more advanced ones too.

Policy recommendations for the group of CCs

While specific policy priorities may differ between countries, there are several key areas where the candidate countries need to push significant policy reform measures forward and stimulate the progressive involvement of the private sector in the use of ICTs. The background for the governments is to adopt a broad-based and comprehensive growth strategy based on a combination of actions in the following four areas, which are very close to the recommendations put forward by the OECD[4] or the EU[5].

- ***Strengthen macroeconomic and microeconomic fundamentals.*** It is essential for these countries to ensure macroeconomic stability, encourage real and financial openness, and significantly improve the allocative efficiency and functioning of markets and institutions, while at the same time also improving the distributive consequences of their operation. The development of some institutions in these countries is still in its infancy (venture capital, small and medium size sector lending, private and public partnership in various fields, notably R&D, etc.), which needs to be addressed especially if the experiences of countries with high productivity growth are considered. These countries improved first their fundamentals, creating an environment that could take advantage of new technologies: these strong fundamentals allowed them to improve productivity and simultaneously draw more people into productive employment.
- ***Facilitate the creation and growth of ICT-producing sectors.*** By increasing competition and dismantling the existing monopolies in telecommunications and technology, by providing

The precise determination of the contribution of ICTs to productivity and growth in the candidate countries is also hampered by various statistical and measurement problems

Besides transition-specific statistical problems, the general difficulties of measuring output are even more acute in candidate counties as a result of the explosive growth of services

While specific policy priorities may differ between countries, there are several key areas where the candidate countries need to push significant policy reform measures forward and stimulate the progressive involvement of the private sector in the use of ICTs

ICT in CCs in a structure needed for the assessment of the links between productivity and ICT. High priority would be put on determining new and qualitative indicators that reflect creative use of ICT in the new candidate countries.

Secondly, following this broad-based statistical data collection, a second research objective should focus on the links between productivity and ICT sectors. Two possibilities are available: either the use of a growth accounting framework or the use of econometric techniques to determine what differences in output growth are caused by the ICT sector and the productivity increase within them. The use of appropriate methodology depends on both the data available and its structure. A detailed assessment of links both at the sectoral and aggregate levels needs to be carried out between ICT sector, labour productivity and total factor productivity growth. Data collection needs to be extended by interviews with managers of ICT producer and user sectors, with on site assessment of the use of ICT in services and manufacturing. It will be essential to determine the quantitative and qualitative use of ICT in manufacturing and services, e.g. to analyse how creatively ICT is used in these segments and the individual countries and how a qualitative difference (more sophisticated use of ICTs) can have quantitative effects in terms of the difference in productivity growth.

The third element of a research policy should deal with the differences in the links between ICT growth and productivity changes, including both labour productivity and total factor productivity. Based on country studies the research policy could determine the factors responsible for the differences in the expansion of ICT sectors and their effect on labour and total productivity. The country studies would determine the role of public and private sector policies, regulation and deregulation in the spread of ICTs and in their effect on productivity. The comparison of candidate countries would produce insights into the role of different factors. Best practices and negative examples could identify the difference human capital makes and its impact on the evolution of labour productivity in ICT producer and user sectors.

Finally, a last research objective would determine those policy measures that the CCs could adopt to foster the growth of their ICT sectors and increase their contribution to productivity growth. The policy conclusions would be related to the desirable public policies (including industrial policy, regulation, direct support for ICT sectors), private policies (market driven investments, innovation and penetration policies, etc.), use of EU funds and also to the role the European Union can play in strengthening the ICT sector and its contribution to productivity growth in new member states.

The Potential Role of Mobile Technologies in the Candidate Countries

Gérard Carat, *IPTS*

Issue: 3G has come to be viewed by some analysts as a promising way for some Candidate Countries (CCs) to leapfrog more costly terrestrial telecommunications infrastructure whilst at the same time offering them the possibility of fast access to the Information society services. In the light of the financial problems faced by 3G operators, the cost of the technology, and competition from cheaper alternative technologies, a fast 3G nation-wide deployment in the CCs is not an optimal short term option.

Relevance: The universal service policy laid down for the 15 EU Member States is not easy to comply with for some of the CCs, especially when it comes to Internet access in areas of limited telecommunications infrastructure. 3G potentially meets this objective, but the cost is prohibitive. This article investigates the relevance of using less costly wireless technologies as a complement for terrestrial infrastructures, in order to meet the eEurope+ objectives. As mobile is becoming the most important telecommunications access channel for many users, CCs could become the EU's test bed for a large scale deployment of mobile Internet content and services.

Introduction

The European Union is currently undergoing its biggest enlargement since its creation. As a result the Candidate Countries (CCs) are in the process of harmonizing their market conditions and legislation with the EU-15. In the field of telecommunications, the challenge is two-fold: offering a telephone connection to all households, in order to meet universal service requirements and at the same time provide a connection capable of accessing data communications at reasonable speed.

Indeed, article 4 of Directive 2002/22/EC on universal service stipulates that

"1. Members States shall ensure that all reasonable requests for connection at a fixed location to the public telephone network and for access to publicly available telephone services at a fixed location are met by at least one undertaking.

2. The connection provided shall be capable of allowing end users to make and receive (...) calls (...) and data communications, at data rates that are sufficient to permit functional Internet access, taking into account prevailing technologies used by the majority of subscribers and technological feasibility."

In the field of telecommunications, the Candidate Countries (CCs) face the dual challenges of offering a telephone connection to all households that is capable of offering data communications at data rates that are sufficient to permit functional Internet access

The views expressed here are the author's and do not necessarily reflect those of the European Commission.

Table 1. Fixed and Mobile penetration in CC13, 2001

	Mobile subscribers		Fixed lines	
	per 100 inhabitants	[illegible]	per 100 inhabitants	[illegible]
Bulgaria	19	[illegible]	36	[illegible]
Cyprus	46	[illegible]	63	[illegible]
Czech Republic	66	128	37	8
Estonia	46	68	35	4.1
Hungary	50	64	37	10.1
Latvia	31	90	31	1.7
Lithuania	26	100	26	3.6
Malta	52	52	52	2.4
Poland	25	127	30	12.1
Rumania	17	175	18	5.7
Slovakia	40	136	29	5.5
Slovenia	76	95	40	2.4
Turkey	30	47	29	4.0
[illegible]	39	[illegible]	36	[illegible]

*Source: ITU 2002. *CAGR: Compounded annual growth rate.*

multimedia data. Improved network technologies and software are broadening the range of services and applications available, particularly by increasing the speed at which services will run over these networks. This has led to the emergence of the new and appealing concept of mobile Internet.

As things stand, data services - and typically Internet content - delivered on a mobile phone do not match those offered on a computer. The most obvious reason for this is that there are considerable differences between the fixed and mobile terminals in terms of screen size, processing power and memory. The "mobile internet bottleneck" therefore exists more in the interface than the network.

The mobile industry is, developing rapidly, however. Innovations such as Java-enabled phones are contributing to narrowing the gap between fixed and mobile Internet. But before this happens, there will likely be an increase of the range of cellular terminal types such as micro browser-enabled smart phones and PDAs (personal digital assistants), as new services and the emergence of new user-segments drive product development.

In the CCs, when data-enabled mobile networks are deployed, users with a computer could effectively access the Internet by connecting their PC. But the PC penetration in the CCs remains limited to date (in 2000 it was 12% in the CCs, compared with 31% in the EU-15[2]). Given that mobile handsets (for instance 2.5G handsets) are generally sold at a fraction of the price of PCs, and given that, depending on the country and the marketing policy, the network operator may subsidize the cost of the handset by up to a third of the price, one of the main potential avenues to deliver data services to CC users could be using data-enabled mobile networks and terminals, which –as mentioned above– will offer ad-hoc mobile data services rather than a replication of the Internet services available on a PC.

If successful, the mobile Internet in the CCs could take a similar path as in Japan, where mobile data has become the main Internet platform, and could potentially become a European test-bed for large scale mobile internet penetration.

Which mobile data platform?

In the EU-15, the decision was made to deploy 3G in a very short time frame in each country. But there is a fine assessment to be made as to whether the CCs should implement 3G with the same speed and coverage obligations as in the EU-15, or focus first on the deployment and viability of 2.5G.

Although the mobile telecommunications industry is evolving towards combining voice and multimedia, Internet content delivered on a mobile phone is as yet no match for that on a computer

If the mobile Internet is successful in the CCs it could become a European test-bed for large scale mobile Internet penetration

ments are therefore quite low compared to building a new 3G network[5].

Earlier, many observers expected that EDGE (Enhanced Data GSM Environment) would be a major transitional step in EU-15 in the migration to 3G during the period 2001-2002. Due to the rapid rollout of the third generation networks in EU-15, EDGE did not become an interesting option for the majority of European operators (ESTO, 2003). But given that CCs are delaying 3G introduction[6] there is a *larger* window of opportunity for 2.5G in these countries. This is important, because EDGE is able to provide almost as much bandwidth as 3G.

Until recently EDGE was considered as more relevant for American operators who are due to license 3G later than in Europe, while in Europe, EDGE was mostly considered as a viable option for those GSM operators who fail to get 3G licenses. But some Western European operators are starting to look at EDGE as a way to stretch their mobile data budget to avoid the cost of full 3G network rollout. In France Bouygues Telecom says it will use EDGE for multimedia services, even though the company now has its own 3G licence[7]. Although there is no consensus among operators on this strategy, EDGE proponents say it represents a low cost way for anyone with a GPRS network to increase capacity between two and four times and offer higher speed data. In September 2002, the mobile telecommunications equipment manufacturer Nokia said that all GSM base stations being shipped worldwide will need only a software upgrade to be EDGE capable. Therefore, operators in the CCs that are building new GSM networks or still in the process of expanding their GSM networks, will have EDGE capability by default.

Other wireless technologies

Another argument calling for caution regarding the immediate introduction of 3G in the CCs is that new technologies are emerging. One example is the smart antenna that upgrades the performances of existing GSM networks either in terms of bandwidth or subscriber capacity. For instance, IntelliCell, provider of smart antennas, claims that adding this technology to a GSM base station typically boosts capacity by a factor of three to seven[8]. Although smart antennas could also be used to cut costs in 3G networks (which generally require more base stations than 2G), it is important to assess the extent to which these technologies can upgrade the performance of 2.5G and/or limit 3G revenue prospects. For instance, ArrayComm claims its I-burst technology offers far better performance than 3G at a fraction of the cost. I-Burst base-stations equipped with smart antennas and co-located with 2G base stations can provide throughput of one megabit per second at about one thirtieth of the cost of building a 3G network for the same area[9].

The same applies to Wireless LAN that could also weaken the delicate take-off of 3G. For instance the increasingly popular Wi-Fi is increasingly used in offices, airports, hotels, shopping malls, etc. Although operators deploying Wi-Fi networks say this technology is complementary to 3G ("3G is aimed at people on the move, while Wi-Fi is for people on the pause"), the bottom line is that those business users who are increasingly using these alternatives (offering wider bandwidth than 3G) are precisely the expected initial users of 3G.

So, although WLANs and 3G networks are in fact complementary technologies interlinking different areas of a network, it may be difficult to persuade 3G licence owners, who have spent billions of euros for spectrum, that they do not face a threat from companies exploiting unlicensed Wi-Fi spectrum free of charge. A possible way to strengthen the complementarity is that WiFi operators who are also 3G licence-holders, will know how to best position each service to optimize revenues.

So-called 2.5G technologies have emerged which allow operators to re-use much of the GSM infrastructure and investments are therefore avoid the cost of building a new 3G network

"Smart Antennas" and Wi-Fi are other technologies enabling cheaper wireless Internet access and thus raising further questions as to the likely returns on investments in 3G networks

Another consideration is that the "mobile Internet" can serve purposes that are not necessarily identical in countries with different levels of infrastructure development. In the richer EU-15 countries where a fixed infrastructure is already extensively deployed, it is a question of marshalling the customers' interest for ubiquity, mobility and portability, therefore complementing a fully-fledged Internet which remains available over fixed lines and computers. In lower income countries, it also addresses the issue of providing a universal service, and may well become the only Internet access channel for a majority as its mobile nature offers the benefit of cheaper deployment cost compared to a terrestrial infrastructure which is not as extensive as in the EU-15. Mobile networks might therefore become the only access platform to telecommunications services for many users, especially in areas with low levels of fixed infrastructure. Insofar as mobile technologies are becoming capable of delivering data services at increasing speed, CCs could become the test bed for wide scale mobile internet services.

...communications terms

...offered rudimentary support for data services, at a maximum ... dubbed 2.5G, were added to the GSM standard to allow for ...

...Data raising data rates to up to 57.6 kbps. HSCSD can be ... through software upgrades. However, HSCSD perpetuates the inefficient ... inherent in any circuit switched mechanism.

...Packet Radio Services), which is packet-switched and ... over the GSM network. Users do not have to dial-up as they are ... up to 115 kbps although in reality they are usually closer to ...

...EDGE (Enhanced Data GSM Environment). This is also ... transmission speed further to a theoretical maximum of 384 kbps.

... third generation cellular systems (3G) are the latest enhance- ... for several services to be delivered simultaneously to each ... under the **IMT 2000** family of standards, comprising 5 ... CDMA) and two core networks (based on GSM and AMPS). ... **UMTS** (Universal Mobile Telecommunications System) and ... CDMA, where CDMA stands for Code Division Multiple Access). ... new radio components, while the core network is based ... new technologies with components from pre-UMTS ... speed depends on the technology that is used, but ... mobile data rate of 144 Kbps, a portable data rate of 384 Kbps ... technical upgrades.

... wireless LAN standards. Rather than offering fully-fledged mobi- ... networking technologies enable wireless Internet when the user ... the pause" in the lingo), rather than on the move, and allow for ...

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point of reference for the benchmarking activities in the CCs in terms of the data gathering methods that have been used and the problems encountered in implementing these methods.

The eEurope monitoring and benchmarking exercise was probably the largest single exercise of its kind yet undertaken, and posed a number of challenges regarding the availability and consistency of data gathered. Among these were:

- *New data gathering activities required*: data for many of the eEurope indicators had not previously been collected by the national statistical offices.
- *Timing*: the desire for frequent data gathering (twice per year), with the results being made available soon afterwards.
- *Methodology*: difficulties in ensuring that all countries gather the data using a consistent methodology.

EU-15 benchmarking has included data gathering in fields such as Internet access, use of computers at school, and on-line government services. The European Commission realized that national statistical offices cannot easily collect new kinds of data and produce results within a short time frame. Hence, in order to obtain comparative results rapidly and regularly, it was decided that special surveys would be needed at the European level. Private companies were therefore requested to conduct these by applying the same methodology in all Member States, with the presentation of the results only a few weeks after data-gathering. Telephone interviews are a core method for gathering data for the eEurope indicators.

An analysis of documents and expert interviews relating to this process raises the following issues.

- *Definition of items, testing of questions and training of interviewers*

Data gathering work is best done in close co-operation with experts in the field. The Commission is already moving data gathering efforts in this direction, for example by intensifying cooperation with the national statistical offices and by working on a refined list of indicators.[3] Items such as "cable modems", for instance, need to be carefully defined. It turned out that "cable modems" do not necessarily provide broadband access. Such definitions need to be checked on a case-by-case basis, and suitable questions need to be asked. Interviewers need to be given appropriate explanatory material and need to be trained to be aware of the issues. Similar issues arise with Internet access via WAP (which is quite limited) or broadband access.

- *Transparency of methodology*

The methods used need to be publicly available. For instance, the differentiation in e-government statistics between a "two-way interaction", a "transaction" and a "delivery" needs to be made explicit. While it makes sense for public reports to provide only key results, it is desirable that complete methodological information, definitions, questionnaires etc. be made available to interested citizens and experts, for example via links on the relevant webpages.

- *Check for relevance*

There may be insufficient time to refine the list of items asked for, leading to lists of items that are excessively long. eEurope comprised 23 indicators, for which many sub-indicators have been defined, to form a total of 7 pages of indicators. There may be scope for reducing the amount of data collected while still producing a useful benchmarking report. Additionally, it may be possible to check which questions gave answers which were actually used to produce the first eEurope Benchmarking Report. It should be possible in future iterations of the survey to omit questions that were not used in the analysis on which the report was based.

- *Cross-checks*

In order to detect response errors, systematic cross-checks are required with other survey data or data from other sources to check whether the collected figures are realistic.

The implementation of the eEurope benchmarking exercise in the EU-15 provides a useful point of reference for the benchmarking activities in the candidate countries

Benchmarking efforts in the EU-15 have involved data gathering in fields such as Internet access, use of computers at school, and on-line government services

collected. This means that data gathering should not only include data for the specified indicators but also 'similar' data already available from different types of sources. These data can be used for cross-checks and for immediate overviews. Furthermore, gathering available data can provide useful insight on how the indicators need to be addressed.

- *Gathering data in face-to-face interviews*

Face-to-face interviews may be the most appropriate means of data gathering in the CCs. Specific recommendations for this kind of activity are:

- Careful preparation of the interviews is needed including the refinement of questions, interviewer training, tests and cross-checks.
- Design of the survey would benefit from the experience of organizations gathering data for the EU-15 exercise, such as national statistical offices.
- Data gathering could benefit from collaboration with local research organizations and local experts that have experience in working within, and around, the identified constraints.

- *Presentation and Interpretation of Results*
  - Benchmarking reports should make information on data gathering methodology available, e.g. by providing links to questionnaires, sampling methods, etc.
  - National experts should review the data, and groups of such experts should investigate their comparability. Unavoidable differences in methodology and therefore in comparability should be indicated clearly. Apparent inconsistencies and particularly low or high values should be explained. Gaps in data gathering should be addressed and estimates should be presented in a way that distinguishes them from the results of actual counts. Different views on an issue should be reflected.
  - The aim should not be to highlight the shortcomings of particular countries but to allow meaningful comparisons: As expressed by the experts, a region with a long tradition of industrial production, or market-orientation, coupled with a high level of education can achieve a significant degree of ICT use more readily. A country or region with significant agricultural production has no similar basis to start from. This means that the benchmarking results of a highly industrialized country are by definition more positive than those from an agricultural area.

Specific recommendations in this respect are:

- To compare regions.
- That countries or regions with looser ties to Western Europe should be treated differently, e.g. compared among each other or with CIS (Commonwealth of Independent States) countries.
- To track changes over time (historical comparison). How did a relatively poor country develop compared to the situation 5 years ago, or to the situation in the late 80s?

eEurope and the Lisbon objectives

While the methodological issues of data collection discussed above are important, the benefits of the current benchmarking exercise also deserve attention. The eEurope Action Plan aims at bringing Europe closer to meeting the Lisbon objectives and contains, for instance, actions aimed at making Internet use cheaper, at educating people how to use the Internet and at encouraging citizens to use it at school, at home and at the workplace. By their own admission, the reports that are generated as a result of the benchmarking activities need to be complemented with an analysis of the extent to which the eEurope Actions have contributed to achieving the Lisbon objectives.[6] They argue that achieving tangible economic benefits "cannot be done quickly" (eEurope 2002 Final Report).

In order to ascertain which benchmarking objectives are most relevant to developing the

It is worth gathering available data that is similar –but not identical– to that required for the indicators so it can be used for cross checking purposes

widely from one country to another. Although policies related to eEurope actions should be designed to achieve their own objectives, these are ultimately those set at the Lisbon summit. Therefore it is particularly important to analyse the effects of any policy on achieving the Lisbon objectives. Benchmarking can be helpful in this process.

Keywords

Information Society, benchmarking, indicators, data gathering, Candidate Countries

Notes

1. eEurope 2002 for the 15 EU countries, eEurope+ 2003 for the Candidate Countries, and eEurope 2005 for EU and Candidate Countries.
2. "Monitoring and Benchmarking the eEurope+ Action Plan", an ESTO project whose basic objective was to analyse the feasibility of, and problems associated with gathering data in candidate countries.
3. Moreover, there are plans to bring data gathering as carried out for eEurope in line with "normal" statistical data gathering by Member States' national statistical offices. Specifically, the European Commission is carrying out work on 'Structural Indicators' with assistance from EUROSTAT and the national statistical offices of Member States, particularly with regard to the quality of these indicators. Similar to the eEurope indicators, the Structural Indicators also stem from the Lisbon European Council held in March 2000. These cover the fields of employment, innovation, economic reform and social cohesion, and an annual synthesis report is set to analyse progress on the areas covered by them. Some of the eEurope indicators will 'live on' within this list of structural indicators.
4. 'New' data compared to what is already being collected by national statistical offices.
5. The survey was carried out in 2002 with 29 experts from research organisations in all Candidate Countries.
6. eEurope Benchmarking Report (2002); eEurope+ 2003 Progress Report (2002), eEurope 2002 Final Report.
7. The survey included 17 local experts from Lithuania, Bulgaria, Romania, Estonia, Slovenia, Turkey, Hungary, the Czech Republic and Poland, covering about 160 of the 170 million inhabitants concerned.
8. For example, Estonia's largest exporter Elcoteq, a manufacturer of mobile communications equipment, and Hungary's third largest exporter IBM Storage.
9. European Commission (2001).

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