

**OECD GLOBAL FORUM ON THE KNOWLEDGE ECONOMY
POLICY FRAMEWORKS FOR THE KNOWLEDGE-BASED ECONOMY:
ICTS, INNOVATION AND HUMAN RESOURCES**

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ISSUES PAPER

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Introduction

1. The capacity of firms, industries and countries to develop and manage knowledge assets is a major determinant of competitiveness and economic growth. Recent analysis has underlined the importance of ICTs for efficiency and growth at firm, sector and national level, particularly when used in appropriate organisational structures and in conjunction with a skilled and learning-orientated workforce. Long-term growth also requires a business environment which encourages innovation and entrepreneurship, and business and government strategies for education, training and life-long learning.¹ These drivers of growth interact, and policy frameworks must take these inter-linkages into account.

2. The general objectives of the Global Forum on Policy Frameworks for the Knowledge-based Economy: ICTs, Innovation and Human Resources, are to:

Stress the importance of a comprehensive policy framework that integrates ICTs, innovation, and human resources as drivers of growth, drawing on recent Latin American and OECD experience; and

Share experiences on the development and future directions of policy frameworks for the knowledge-based economy, and advance this general policy agenda in the Latin American context.

3. The Forum will provide an overview of policy developments reflecting the increased role of knowledge development and management. Specific attention is given to three inter-related policy clusters:

1. Information technologies including the communications infrastructure and e-business;
2. Science, technology and innovation; and
3. Skills, education and knowledge-based employment.

4. It will focus on integrated approaches that link policy development in these areas to broad economic and social goals. Individual sessions will present the experience and lessons of OECD and non-OECD countries. Discussion will include the economic benefits of ICTs and innovation, the cost of non-participation in the knowledge economy, and the human resource and policy requirements for change.

5. The OECD has extensive experience identifying factors and policies underpinning the knowledge-based economy through the work of the Information, Computer and Communications Policy Division (ICCP), Science and Technology Policy Division (STP), and the Directorate for Education/Centre for Educational Research and Innovation (EDU/CERI). This has identified best policy practices in OECD countries, now being shared with non-member economies through the Centre for Co-operation with non-member (CCNM) Global Forums. This Forum builds on the Emerging Market Economy Forum on Electronic Commerce Dubai 2001, and work of the implementation teams of the Digital Opportunity Task Force.

¹ This work is comprehensively summarised in: OECD (2001a), *Drivers of growth: Information technology, innovation and entrepreneurship*, Paris; OECD (2001b), *The new economy: Beyond the hype. The OECD Growth Project*, Paris.

6. The Global Forum on *Policy Frameworks for the Knowledge-based Economy: ICTs, Innovation and Human Resources* is organised by the OECD in co-operation with the Ministry of Science and Technology of Brazil. The main OECD contributors are the ICCP and STP Divisions of the Directorate for Science, Technology and Industry in conjunction with EDU/CERI as part of the outreach activities of the CCNM. It is being organised in co-operation with the Inter-American Development Bank (IDB) and the UN Economic Commission for Latin America and the Caribbean (ECLAC), with additional support from the World Bank InfoDev Conference Scholarship Fund.

1. Economic growth and the knowledge-based economy

7. Growth is the result of a comprehensive set of actions and circumstances that create conditions for positive change. These include openness to ideas, trade and investment as well as well-functioning economic and social institutions that provide more scope for risk-takers to explore new business opportunities and improvements that come with new technologies and economic change. Harnessing the potential of ICTs, innovation and enhancing human resources are essential for growth in the knowledge-based economy.

8. The development and use of information and communication technologies (ICTs) have emerged as a key technology with potential to transform economic and social activity. ICT-related output growth and productivity gains can come through ICT use as well as production. They have led to more rapid growth in countries where business, organisational and institutional conditions have been conducive to growth. In the OECD these include countries as different as Australia, Finland and the United States. But ICT is not the only factor explaining growth, and policies to bolster only these technologies will not on their own steer countries to a higher growth path.

9. Other factors central to policy reform – innovation and human resources combined with competition, openness and flexibility – are important in driving the uptake of new technologies and encouraging firms to use them in productivity-enhancing ways. It is important that the economic environment provides competitive incentives for firms to develop and adopt new technologies, and use them to transform businesses, develop new products and raise productivity. Innovative and knowledge-based practices add more value along value chains. Looking forward, bringing high-end links of the value chain into the domestic economy depends on improving the quality of human capital and responding to the changing workplace and social demands.

10. Governments are faced with a new economic environment. Policy-makers in all countries are recognising the importance of knowledge-based economies, and are increasingly adopting knowledge-based strategies. Transformations resulting from development, production and use of ICTs coupled with product and process innovation and continually enhanced human resources are as important as those associated with previous major technological innovations. Governments need to take action to maximise potential benefits, manage the adjustment process and contain social costs. Policy can provide incentives to accelerate ICT diffusion, encourage business and household adoption, and build confidence amongst consumers. Looking ahead, growth prospects will also depend on the impacts of other major innovations such as biotechnology, and of broader social changes such as ageing of populations and international migration.

11. Policymakers have to invest time and political capital in meeting these challenges. Many of the countries that achieved higher growth rates in the 1990s reaped the fruits of earlier efforts, including macroeconomic and structural policy changes of the 1980s. Most of the economies in the Latin American and Caribbean region have taken the basic policy steps necessary to begin realising gains from technology. At the same time, progress is hampered by lingering economic and political uncertainty and by barriers to

affordable access to ICT goods and services and to network infrastructure. Further major steps still need to be taken towards an integrated regional approach to knowledge-based development.

12. Topics for discussion in this and following sessions include:

- What is the applicability of knowledge-based development strategies for Latin America and other emerging economies? What strategies best foster creative knowledge-based activities?
- How can these strategies be broadly based to ensure that the whole economy contributes to and benefits from the growth of knowledge-based industries and activities?
- What kinds of strategies and economic conditions are promoting competitiveness along firm and industry value chains?
- What kinds of strategies encourage the growth of domestic high-value activities while maintaining and expanding openness to international networks?
- Are there new strategies to link FDI and foreign knowledge-based activities to domestic innovation and entrepreneurship?
- What are the strengths and weaknesses, opportunities and threats for developing knowledge-based activities in the current Latin American economic circumstances of slower growth and external capital market constraints?
- What are the priorities and sequencing for public and private sectors to continue building sustainable knowledge-based activities?

2.1 ICTs and e-business: policy frameworks and new issues

13. The ICT supply side is a major source of innovation and entrepreneurship and an important factor in growth performance and business dynamism despite its current downturn. Furthermore, diffusion and use of ICTs are increasingly recognised to have major impacts on efficiency and productivity performance at firm, sector and national level. Many countries have developed broad ICT policy frameworks, which include encouraging innovation in the ICT sector, ICT skills and improving access to and use of ICT, and in some cases ambitious plans to improve relative ICT rankings and enhance their contribution to growth.

14. Policy frameworks on the supply side cover for example, support for basic research and development, improving information supply to businesses, and raising specific and generic ICT skills. On the use side, policies have focused on improving IT equipment and network access for businesses and households (e.g. for rural areas, socially excluded groups), supporting the IT environment in areas such as security, authentication and intellectual property rights, and moving government services online to improve distribution and efficiency. Government policy has increasingly shifted to improving diffusion mechanisms and enhancing uptake conditions to contribute to productivity growth.

15. In the area of communications networks, pro-competitive market liberalisation policies have been pursued to enable rapid diffusion and widespread use of new and dynamic technologies to the majority of users. Complementary policies may be needed to ensure that all segments of the population and geographic areas have access to these technologies, for example improving the conditions of access to local communication infrastructures through effective policies or regulating unbundling and shared access to the local loop and interconnection frameworks. Flexible but effective frameworks also need to be established

for privacy, security and consumer protection to strengthen trust and build confidence in the consumer side of electronic business, with governments needing to work with business and civil society.

16. Many initiatives have been undertaken to increase the supply of professional ICT skills and to improve the level and spread of basic generic ICT skills. Short-term initiatives need to be business and market-led. But there are important inputs from government in long-term development of a flexible and adequately-trained work-force in the broader policy context of encouraging lifelong learning and professional education, and adapting the content of education and training to new demands and the development of ICTs.

17. Smaller enterprises may face information and resource gaps compared to larger enterprises and these are usually more pronounced in new technologies, including ICTs. Private and public efforts to improve information flows to lagging sectors and smaller firms may help overcome these gaps and provide positive network benefits. Training and skill development strategies are crucial in government policies for the small-firm sector, and network infrastructure, transaction security and regulatory issues may also need addressing to the extent that there are disincentives to small firms.

18. Topics for discussion:

- What is the evolving policy balance between ICT supply and ICT diffusion and use in the Latin American context?
- What kinds of business strategies and public policies are proving successful in developing ICT goods and services supply side activities? What is the mix between focused programmes in areas such as R&D and advanced skills, and framework policies in capital, labour and product markets that promote competition, openness and flexibility? How are content and multimedia applications being affected?
- What is the role of network liberalisation, competition and confidence building (security and trust measures), and policies focused on lagging groups, firms and regions? What other areas of diffusion and use have priority?
- What are the private and public roles in providing ICT training and education?
- Are e-government applications stimulating e-business uptake as well as increasing government efficiency?

2.2 ICTs and e-business: national strategies and regional challenges

19. Within these broad and common policy frameworks, there is a wide range of individual national policy strategies and approaches based on economic and social structures, infrastructure development and availability, business networks, institutional capabilities, and government structures and roles. Furthermore, these national strategies have to be placed in the broader context of regional capabilities and the opportunities to gain economies of scale and scope in the context of infrastructure, business and social networks. Work at OECD has demonstrated that policy approaches can be broadly grouped among OECD countries into an English-speaking market focused group, a European broad-based consensual group (with differences between Northern and Southern Europe), and an Asian consensual grouping.² History, institutional structures and economic circumstances combine to lead different countries to adopt different

² See OECD (2002), *Information Technology Outlook 2002*, Paris, Chapter 8.

national strategies within this wider framework. There are common elements in all approaches, but the emphasis, priorities and sequencing differ.

20. In the Latin American context two distinctly different models are possible with structured government-led approaches stressing equality of access to ICTs, and more market-oriented self-regulating bottom up strategies. For example all countries have adopted regulatory initiatives to enhance competition in network infrastructure and the supply of ICTs. However these approaches are necessary but may not be sufficient to ensure wide access and policies aimed at overcoming differences in the distribution of access within countries and regions are an important complement. To the extent that differences persist, country and region-specific initiatives may be aimed at: *i*) improving diffusion to individuals and households via access through schools and other public institutions; *ii*) improving diffusion to businesses via ICT training and information diffusion for small businesses; *iii*) ICT education and training in schools, vocational training, teacher training; and *iv*) judicious use of government services on line, and government procurement to provide demonstration effects.

21. To take another example, online government information and services and online government procurement are part of broad government knowledge management strategies to improve internal government efficiency and increase external reach to citizens and businesses. These e-government initiatives can provide important public demonstration and diffusion effects. On the other hand, to the extent that there are very large income and regional differences in access to ICTs and the Internet, such measures will accentuate the digital divide among different socio-economic groups. Strategies to overcome these differences can be largely based on increasing competition to drive down access prices, regional and socio-economic targeting to provide assistance or special facilities to those without access, or a mix of the two.

22. Topics for discussion:

- What are key national challenges to expand the adoption, use and benefits of ICTs?
- How have these changed over time?
- To what extent are policy approaches to ICTs and e-business seen in a regional Latin American context?
- What is the scope for more integrated regional approaches to ICT and e-business? Which areas have priority?

3. Innovation

23. Innovation is a fundamental source of growth. At firm level innovation in products, processes and organisational structures is a major source of growth, and explains the ways that economies develop. However, the ability to harness the potential of science, technology and innovation to improve growth performance is diverse among countries. Innovation is not always based directly on research and development (R&D). It often involves organisational as well as technological change and complementary investments in other areas (*e.g.* worker training, manufacturing, marketing). Nevertheless, higher levels of R&D intensity are correlated with higher levels of economic performance. R&D appears to be growing in importance, as economies become more knowledge-based and fast-growing new industries become more science-based.

24. Analysis in areas such as the management of innovation and science systems, public funding of R&D, industry/science relationships, development of high-tech spin-offs and management of IPRs shows that countries that have performed best are those that have successfully adapted their science and technology (S&T) systems to evolving patterns of innovation, enhanced interactions between the private and public sector, and improved framework conditions for innovation. Although much depends on the specific characteristics of national innovation systems, there are important general policy lessons. For the most part, these require more refined use of existing policy tools rather than more government action. Industry also has an important role to play in adapting R&D investment and sourcing, knowledge management and industry/science relations. Furthermore, innovation facilitates the fulfilment of other societal needs, such as improved health and environment protection.

25. Greater formal and informal knowledge-sharing among R&D-conducting firms, as well as support to SMEs by targeted research organisations, are critical for boosting innovative effectiveness. The effectiveness of R&D appears to be greater where the number and variety of R&D performers is greater and where the scope for market transactions (e.g. through licensing, mergers, and acquisitions) is larger. Informal networks are vital components of innovation systems. However, important efficiency gains can be derived from increased market-based transactions of codified knowledge and effective regimes of IPR protection. Policies which facilitate patenting and lower its cost can improve countries' ability to innovate.

26. Openness to international flows of knowledge is also increasingly important. As the innovation process becomes more global, firms and research institutions draw more on international pools of scientific and technical expertise. This is particularly relevant for smaller countries that rely on external sources of knowledge to supplement their narrowly focused domestic R&D efforts, but is also of growing importance for larger countries. National policies must attempt to both strengthen the domestic R&D base to augment its absorptive capacity and develop international linkages throughout the science and technology system.

27. Complementary private and public R&D investments are a prerequisite for sustained innovation performance. Government financing of R&D remains critical in ensuring the generation of the fundamental scientific and technical knowledge, and correcting for other market failures that impede business R&D, especially in SMEs. However, considerable variation exists in the performance of countries with similar levels of R&D investment. The ways in which this funding is channelled are crucial (e.g. the types of institutions supported, the mechanisms used to finance R&D), the ways in which public research organisations are structured and managed, and how these contribute to the development of high-value added activities.

28. Countries have different objectives and starting points for reform and differ in the particular initiatives that can most effectively boost capacities and growth potential. Countries with low levels of R&D may find it more effective to strengthen incentives to boost public and private R&D expenditures. Economies with higher levels of R&D may benefit more from reforms to public research institutions (universities and public laboratories) that enhance worker mobility and industry-science linkages. Of key importance in Latin America are the development of small-business R&D, venture and risk capital and updating regulatory frameworks governing publicly financed research. These should aim at increasing the share of high value-added activities in Latin American economies.

29. In the rapidly changing economic environment for innovation many adjustments are taking place, for example in business support for R&D and the role and functioning of public research institutions. These changes require adjustments in policies and public financing. The collection of new data and development of new R&D and innovation indicators are needed to benchmark innovation policies and performance and increase their contribution to economic growth.

30. Topics for discussion:

- What is the applicability of innovation development strategies for Latin American and other emerging economies? What are the private and government roles in supporting innovation strategies? How can a better match be achieved between policy objectives and support mechanisms?
- What is the balance between basic and long-term mission-oriented research compared with applied development?
- What are new directions in public R&D and innovation support, for example in the area of programmes to support small business?
- To what extent do public laboratories and universities need restructuring and different funding arrangements to strengthen knowledge transfer to the private sector?
- Are there particular issues with the mobility of S&T workers within and among sectors and countries?
- Can regional and international R&D and innovation co-operation be increased? In which priority areas?

4. Human resources

31. Human capital (the skills and competencies embodied in workers) is a central pillar of development and growth. There is a well-established relationship between human capital and labour productivity. Improvements in one lead to increases in the other, and empirical studies have found that human capital is a significant determinant of economic growth. With increasing recognition of the importance of the knowledge base, there is renewed interest in the productivity-enhancing role of human capital, and equal access to education and learning are crucial for expanding human capital and increasing its contribution to growth. One of the factors behind the good growth record of some countries has been the availability of a large pool of qualified personnel. And for ICT and other new technology to be developed and used effectively and network externalities of new technology to materialise, the right skills and competencies must be in place.

32. The shift towards knowledge economies has resulted in rising "knowledge-intensive" employment. And because skilled labour shortages are a growth constraint, many OECD countries have been using foreign sources to fill shortages of qualified personnel, presenting new challenges for home countries supplying the personnel and for host countries that increasingly rely on foreign sources. If strategies to boost growth via ICTs and other new technology are to succeed, policies to enhance human capital must be prioritised. Properly managed, many of these policies will also help to narrow the digital and knowledge divides. To achieve this, it is necessary to invest in quality at primary and secondary stages of national education systems. These investments help boost labour market participation and are more cost-effective than later interventions to remedy school failure. Dropout rates from primary and secondary education also have to be lowered. Apart from fundamental concerns regarding basic literacy, ICT literacy has become part of basic competencies and also has to be improved, which in OECD countries has involved better recruitment of qualified teachers and making pay more competitive.

33. In order to transfer learned skills into the labour market, it is important to create or strengthen pathways that combine education with workplace experience. Mechanisms of co-financing between employers, trainees and government can ensure cost-effectiveness. Involving firms in the definition of curricula and funding have been valuable in some countries, as have performance-based financial incentives, and the question is to what extent these mechanisms apply in the Latin American context.

34. However it is not enough to focus on future generations of workers. In periods of rapid technological change, it is important to increase adult and worker participation in further education. New and innovative instruments such as systems of recognition of competencies and tax reform to ensure that firm training is not penalised, can enhance incentives to engage in further training while controlling costs.

35. Employee involvement and effective labour-management relationships and practices are important to foster change and raise productivity. There are a wide range of institutional structures and relationships, but it is important to ensure that employment regulations and collective bargaining institutions do not hamper knowledge-based organisational change and adaptation to the new economic environment.

36. Topics for discussion:

- How can Latin American countries develop national education systems and human resources to respond to the challenges of the knowledge-based economy?
- What strategies are successful in increasing access and improving equity related to education and human resources?
- What are receiving priority attention – investing in high-quality primary and secondary education, raising completion rates for primary and secondary education, expanding vocational education (secondary and post-secondary), and tertiary (university) education, and improving system quality?
- What kinds of public and private sector approaches have been successful in strengthening the links between education, labour markets and business? What is the role of ICT training and human resource development?
- What approaches are being adopted in Latin America to provide training and life-long learning opportunities?
- Are there particular obstacles to workplace changes and ensuring worker participation?

5. Policy round-table

37. This session is designed to assess how to achieve the policy aims of the Forum:

- To discuss and agree on ways of developing policy frameworks that integrate ICTs, innovation, and human resources as drivers of growth, drawing on recent Latin American and OECD experience.
- Assess likely future policy directions to support development of the knowledge-based economy, and
- Advance this policy agenda in the Latin American context.

38. The previous sessions have discussed the different elements of strategies to develop knowledge-based economies and how they can contribute to long-term growth. They have also examined some of the barriers to developing such economies and the kinds of incentives needed to achieve the objectives of deepening and widening the knowledge base and linking it with growth-enhancing mechanisms. This session should identify the policies that are needed, and help to prioritise them, taking into account the wide diversity of experience and institutions in different countries.

39. Topics for discussion:

- What policies have priority in developing the Latin America knowledge base and linking this with growth strategies?
- What has been the experience in developing policy frameworks that better integrate ICT, innovation and human resource strategies and policies? What are the lessons learned and future directions?
- How can individual policies and approaches be integrated into regional Latin American approaches? What are the likely long-term benefits of integration?
- Countries, industries and individuals are increasingly integrated into global networks. How does global integration shape the development and use of the national and regional knowledge base?
- What are the future policy priorities and sequencing at national, regional and international level?