

# The Knowledge Economy

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**Abstract.** We are living through a period of profound change and transformation of the shape of society and its underlying economic base. The nature of production, trade, employment and work in the coming decades will be very different from what it is today. In an agricultural economy land is the key resource. In industrial economy natural resources, such as coal and iron ore and labour are the main resources. A knowledge economy is one in which knowledge is the key resource. One in which the generation and the exploitation of knowledge has come to play the predominant part in the creation of wealth.

**Key words:** knowledge economy, globalization, organization, comparative advantage

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## 1. Introduction

It is not a new idea that knowledge plays an important role in the economy, nor is it a new fact. All economies, however simple, are based on knowledge about how, for example, to farm, to mine and to build; and this use of knowledge has been increasing since the Industrial Revolution. But the degree of incorporation of knowledge and information into economic activity is now so great that it is inducing quite profound structural and qualitative changes in the operation of the economy and transforming the basis of competitive advantage. The rising knowledge intensity of the world economy and our increasing ability to distribute that knowledge have increased its value to all participants in the economic system. The implications of this are profound, not only for the strategies of firms and for the policies of government but also for the institutions and systems used to regulate economic behaviour.

The second section explains the "New Economy" concept. The knowledge-based economy is a new step in the civilization development, ensuring a new and better lifestyle. This economy relies on using the information from all fields of human activity and existence, having a great economic and social impact. The third section explains the importance of knowledge and intellectual capital as the main driving forces in the new millennium. Knowledge is more powerful and valuable than the natural resources and big factories. The last section contains some conclusions about the importance of the knowledge economy.

## 2. What is the Knowledge Economy?

Capitalism is undergoing an epochal transformation from a mass production system where the principal source of value was human labour to a new era of 'innovation-mediated production'

where the principal component of value creation, productivity and economic growth is knowledge.

The Knowledge Economy is emerging from two defining forces: the rise in knowledge intensity of economic activities, and the increasing globalization of economic affairs. The rise in knowledge intensity is being driven by the combined forces of the information technology revolution and the increasing pace of technological change. Globalization is being driven by national and international deregulation, and by the IT related communications revolution. However, it is important to note that the term 'Knowledge Economy' refers to the overall economic structure that is emerging, not to any one, or combination of these phenomena.

**Increasing knowledge intensity.** The last twenty years have seen an explosion in the application of computing and communications technologies in all areas of business and community life. This explosion has been driven by sharp falls in the cost of computing and communications per unit of performance, and by the rapid development of applications relevant to the needs of users. Digitalization, open systems standards, and the development software and supporting technologies for the application of new computing and communications systems – including scanning and imaging technologies, memory and storage technologies, display systems and copying technologies – are now helping users realize the potential of the IT revolution.

It is in the Internet that these technologies come together, and it is the Internet phenomenon that exemplifies the IT revolution. Over the first decade of its development the Internet remained a specialist research network.

In economic terms, the central feature of the IT revolution is the ability to manipulate, store and transmit large quantities of information at very low cost. An equally important feature of these technologies is their pervasiveness. While earlier episodes of technical change have centred on particular products or industrial sectors, information technology is generic. It impacts on every element of the economy, on both goods and services; and on every element of the business chain, from research and development to production, marketing and distribution.

Because the marginal cost of manipulating, storing and transmitting information is virtually zero, the application of knowledge to all aspects of the economy is being greatly facilitated, and the knowledge intensity of economic activities greatly increased. This increasing knowledge intensity involves both the increasing knowledge intensity of individual goods and services, and the growing importance of those goods and services in the economy.

**Globalization.** The other main driver of the emerging knowledge economy is the rapid globalization of economic activities. While there have been other periods of relative openness in the world economy, the pace and extent of the current phase of globalization is without precedent.

The global communications revolution has been accompanied by a widespread movement to economic deregulation, including:

- the reduction of tariff and non-tariff barriers on trade in both goods and services;
- the floating of currencies and deregulation of financial markets more generally;
- the reduction of barriers to foreign direct investment and other international capital flows, and of barriers to technology transfers; and
- the deregulation of product markets in many countries, particularly in terms of the reduction in the power of national monopolies in areas such as telecommunications, air

transport and the finance and insurance industries.

Together these changes have led to rapid globalization. The recent phase of globalization is characterized by rapid increases in the flows of foreign direct investment (FDI), capital transfers other than direct investment, trade flows of goods and services, and technology transfers. But two things stand out. First, FDI and other capital flows have grown more rapidly in recent years than have trade flows – suggesting that the current phase of globalization is about capital movement rather than trade. Second, these flows of FDI, other capital, trade and technology are becoming increasingly inter-related.

The rapid integration of world financial and capital markets since the early 1980s impacts on every element of the financial systems of developed countries, as well as on the systems of an increasing number of developing countries. Financial market integration has witnessed a sharp expansion in net long-term lending to developing countries, a rise of foreign direct investment, and in international bank lending and securities financing, together with the related explosion of derivatives.

These forces impact at the firm level, as firms are increasingly required to adopt global strategies to deal with the new realities. Global competition in all major markets between competitors from all major countries, the increasing multinational origin of the inputs to production of both goods and services, the growing intra-industry and indeed intra-product nature of world trade and the interdependent role of the various elements of globalization are all contributing to a transformation of the global economy.

Characteristics of globalization	Characteristics of the Knowledge Economy
<p>The main characteristics of globalization since the 1980s can be summarized in terms of impacts relating to the emergence of a global system, global competition, the location, organization and rationalization of economic activity.</p> <ul style="list-style-type: none"> <li>• As economic activity becomes globalized there is an increasing inter-dependence of international flows of goods and services (trade), direct investment, technology and capital transfers.</li> <li>• No longer does industry face a domestic market protected from international competition.</li> <li>• Competition is becoming increasingly global and the ability to compete head-to-head in all major markets is essential for success.</li> <li>• Scale is becoming increasingly important in order to permit firms to roll-out into all major global markets quickly.</li> <li>• Whether niche or global brand, rapid expansion into major markets now requires outward investment as well as exports.</li> <li>• Global production is bringing a new global rationalization of production, coordination, combination and accumulation of assets.</li> <li>• The comparative advantage of locations increasingly relates to firms' objectives, and is relative to those objectives.</li> <li>• The globalization of production and sourcing is leading to increasing specialization and the facture of chains of production ('filieres') across international boundaries.</li> </ul>	<p>The emergence of the knowledge economy can be characterized in terms of the increasing role of knowledge as a factor of production and its impact on skills, learning, organization and innovation.</p> <ul style="list-style-type: none"> <li>• There is an enormous increase in the codification of knowledge, which together with networks and the digitalization of information, is leading to its increasing commodification.</li> <li>• Increasing codification of knowledge is leading to a shift in the balance of the stock of knowledge – leading to a relative shortage of tacit knowledge.</li> <li>• Codification is promoting a shift in the organization and structure of production.</li> <li>• Information and communication technologies increasingly favour the diffusion of information over re-invention, reducing the investment required for a given quantum of knowledge.</li> <li>• The increasing rate of accumulation of knowledge stocks is positive for economic growth (raising the speed limit to growth). Knowledge is not necessarily exhausted in consumption.</li> <li>• Codification is producing a convergence, bridging different areas of competence, reducing knowledge dispersion, and increasing the speed of turnover of the stock of knowledge.</li> <li>• The innovation system and its 'knowledge distribution power' are critically important.</li> <li>• The increased rate of codification and</li> </ul>

Characteristics of globalization	Characteristics of the Knowledge Economy
<ul style="list-style-type: none"> <li>• There is substantial national and regional structural adjustment.</li> <li>• The organization of economic activity is increasingly flexible, network oriented (including user-producer interactions) and built through clustering.</li> <li>• The boundary between markets and hierarchies is shifting, the nature and form of integration (vertical and horizontal) is changing and new forms of 'functional integration' are emerging.</li> <li>• Time is becoming increasingly important for competitiveness, a key aspect of value – essentially a new factor of production.</li> </ul>	<p>collection of information are leading to a shift in focus towards tacit ('handling') skills.</p> <ul style="list-style-type: none"> <li>• Learning is increasingly central for both people and organisations.</li> <li>• Learning involves both education and learning-by-doing, learning-by-using and learning-by-interacting.</li> <li>• Learning organisations are increasingly networked organisations.</li> <li>• Initiative, creativity, problem solving and openness to change are increasingly important skills.</li> <li>• The transition to a knowledge-based system may make market failure systemic.</li> <li>• A knowledge-based economy is so fundamentally different from the resource-based system of the last century that conventional economic understanding must be re-examined.</li> </ul>

### 3. What's New about the New Economy?

In the 21st century, comparative advantage will become much less a function of natural resource endowments and capital-labour ratios and much more a function of technology and skills. Mother nature and history will play a much smaller role, while human ingenuity will play a much bigger role.

**Information revolution.** The IT revolution has intensified the move towards knowledge codification, and increased the share of codified knowledge in the knowledge stock of advanced economies. All knowledge that can be codified and reduced to information can now be transmitted around the world at relatively little cost. Hence, knowledge is acquiring more of the properties of a commodity. Market transactions are facilitated by codification, and the diffusion of knowledge is accelerated.

Codification is also reducing the importance of additional, duplicative investments in acquiring knowledge. It is creating bridges between fields and areas of competence and reducing the 'dispersion' of knowledge. These developments promise an acceleration of the rate of growth of stocks of accessible knowledge, with positive implications for economic growth.

**Flexible organization.** Globalization in the 1950s and 1960s was driven by the global spread and development of Taylorism, but it is post-Taylorist, flexible forms of organization that drive and shape globalization today. Flexible organisations reduce waste and increase the productivity of both labour and capital by integrating 'thinking' and 'doing' at all levels of their operations. In doing so they eliminate many layers of middle management, which are dysfunctional in terms of information flow. Flexible organisations also avoid excessive specialisation and compartmentalisation by defining multi-task job responsibilities (which calls for multi-skilled workers) and by using teamwork and job rotation.

Flexible organisations merge flexibility, high product quality and a degree of customization, with the speed and low unit costs of mass production. Taylorist producers attained higher levels of productivity than craft producers through economies of scale in the production of many standardized products, but flexible producers can attain higher productivity levels than Taylorist producers through economies of scope in the production of a diversity of more customized products or services, without sacrificing economies of scale. They do this by more fully utilising the human capabilities of their workers.

**Knowledge, skills and learning.** Information and communication technologies have greatly reduced the cost and increased the capacity of organisations to codify knowledge, process and communicate information. In doing so they have radically altered the 'balance' between codified and tacit knowledge in the overall stock of knowledge. In essence, creating a shortage of tacit knowledge. As access to information becomes easier and less expensive, the skills and competencies relating to the selection and efficient use of information become more crucial, and tacit knowledge in the form of the skills needed to handle codified knowledge becomes more important than ever.

Information and communication technology investments are complementary with investment in human resources and skills. The skills required of humans will increasingly be those that are complementary with information and communication technology; not those that are substitutes. Whereas machines replaced labour in the industrial era, information technology will be the locus of codified knowledge in the knowledge economy, and work in the knowledge economy will increasingly demand uniquely human (tacit) skills – such as conceptual and inter-personal management and communication skills.

**Innovation and knowledge networks.** The knowledge economy increasingly relies on the diffusion and use of knowledge, as well as its creation. Hence the success of enterprises, and of national economies as a whole, will become more reliant upon their effectiveness in gathering, absorbing and utilising knowledge, as well as in its creation.

A knowledge economy is, in effect, a hierarchy of networks, driven by the acceleration of the rate of change and the rate of learning, where the opportunity and capability to get access to and join knowledge-intensive and learning-intensive relations determines the socio-economic position of individuals and firms. Firms must become learning organisations, continuously adapting management, organization and skills to accommodate new technologies and grasp new opportunities. They will be increasingly joined in networks, where interactive learning involving creators, producers and users in experimentation and exchange of information drives innovation.

**Learning organisations and innovation systems.** In a knowledge economy, firms search for linkages to promote inter-firm interactive learning, and for outside partners and networks to provide complementary assets. These relationships help firms spread the costs and risks associated with innovation, gain access to new research results, acquire key technological components, and share assets in manufacturing, marketing and distribution. As they develop new products and processes, firms determine which activities they will undertake individually, which in collaboration with other firms, which in collaboration with universities or research institutions, and which with the support of government. Innovation is thus the result of numerous interactions between actors and institutions, which together form an innovation system.

Those innovation systems consist of the flows and relationships which exist among industry, government and academia in the development of science and technology. And the interactions within these systems influence the innovative performance of firms and ultimately of the economy. The 'knowledge distribution power' of the system, or its capability to ensure timely access by innovators to relevant stocks of knowledge, is therefore a major determinant of prosperity.

**Global competition and production.** A consequence of deregulation and advances in communication technologies has been a strengthening of world competition, and the emergence of a new form of 'global competition'. Most firms with a dominant position no

longer belong to just one leading country. They are multinational or transnational. To compete with their rivals successfully firms must now compete head-to-head in all markets (including their home market), and they must rapidly attain global scale in production and/or rapidly roll out products and services into multiple markets in order to do so. In this new environment, competitiveness depends increasingly on the coordination of, and synergy generated between, a broad range of specialised industrial, financial, technological, commercial, administrative and cultural skills which can be located anywhere around the world.

Production is being rationalised globally, with firms combining the factors, features and skills of various locations in the process of competing in global markets. There are three major dimensions of change involved: increasing national (locational) specialization; increased international 'fracturing' of value chains or chains of production – witnessed in increased intra-industry and intra-firm trade, and greater line-item by line-item trade imbalances; and substantial structural dislocation in local, regional and even national economies, and a consequent need for substantial structural adjustment.

**Strategy and location.** A number of things have happened since World War II to cause a fundamental re-think of the notion of comparative advantage. It has been shown that during the postwar years exports from the relatively capital rich, labour poor United States were actually more labour intensive than were the United States' import competing products. More recently, intra-industry trade has grown rapidly, as has trade between countries with similar factor endowments. It has, in fact, become increasingly obvious that observable patterns of trade and specialization do not always fit with the law of comparative advantage. Traditional explanations of international trade and the location of production no longer hold.

Moreover, globalization is a fundamentally microeconomic phenomenon, driven by the strategies and behaviour of firms. In a global strategy the comparative advantages of each nation, state or location are no longer considered separately. Comparative advantages are determined by a firm's objectives – e.g. low production costs, new markets for standardized or differentiated products, access to new technologies or know-how. Hence, comparative advantages, advantages of location, will vary according to the firm's global strategy. Nations, states and locations need to attend to the development of a coherent set of advantages, and find a niche in the global economy which attracts the type of economic activity they want to foster. Attending to the generic business environment is necessary, but no longer sufficient.

**Clustering in the Knowledge Economy.** Networks and geographical clusters of firms are a particularly important feature of the knowledge economy. Firms find it increasingly necessary to work with other firms and institutions in technology-based alliances, because of the rising cost, increasing complexity and widening scope of technology. Many firms are becoming multi-technology corporations locating around centers of excellence in different countries. Despite improved capability for global communication, firms increasingly co-locate because it is the only effective way to share understanding (tacit knowledge). Consequently, skills and life-style are becoming increasingly important locational factors.

As we enter the age of human capital, where firms merely lease knowledge-assets, firms' location decisions will be increasingly based upon quality-of-life factors that are important to attracting and retaining this most vital economic asset. In high-tech services, strict business-cost measures will be less important to growing and sustaining technology clusters ... Locations that are attractive to knowledge assets will play a vital role in determining the economic success of regions.

**Economics of knowledge.** In the knowledge economy there are new ground rules. Knowledge

has fundamentally different characteristics from ordinary commodities and these differences have crucial implications for the way a knowledge economy must be organized. The whole nature of economic activity, and our understanding of it, is changing.

Unlike physical goods information is non-rival – not destroyed in consumption. Its value in consumption can be enjoyed again and again. Hence, social return on investment in its generation can be multiplied through its diffusion.

Ideas and information exhibit very different characteristics from the goods and services of the industrial economy. For example, much more than is the case with a frozen dinner or a haircut, the social value of ideas and information increases to the degree they can be shared with and used by others. More important, the costs associated with their production are distributed very differently over time. While up front costs associated with the production of traditional goods such as a car or house may not necessarily be high, each item is still costly to produce. The more of these one produces, the more likely one will eventually encounter scarcities that drive up production costs and reduce the size of social returns. In the case of innovation, ideas and information, however, the opposite would seem largely to be the case. While up front development costs can be very high, the reproduction and transmission costs are low. The more such items are (re)produced, the greater the social return on investment.

Traditional economics is founded on a system which seeks to optimize the efficient allocation of scarce resources, but because of the unique characteristics of information and knowledge the very meaning of scarcity is changing. Indeed, the scarcity defying expansiveness of knowledge is the root of one of its most important defining features. Once knowledge is discovered and made public, there is essentially zero marginal cost to adding more users.

Knowledge goods and services are subject to, or part-and-parcel of, almost every form of 'market failure' that traditional approaches to economics have identified. Indeed, there is every sign that in a knowledge-based system market failure will be systemic, and every sign that we need a fundamentally different economic understanding for the knowledge economy.

**Convergence or divergence.** One disturbing feature of the emerging knowledge economy is increasing evidence that the nations of the world are polarising, rather than converging, in economic terms. Standard neoclassical growth theories suggest that economies subject to market forces should converge in terms of per capita GDP levels, either absolutely or relatively. But the reality is quite different.

Countries appear to be moving towards two peaks or nodes, one at high incomes and one at relatively low incomes. This polarisation of countries into different strata of economic activity and of living standards is becoming both pronounced and persistent.

What the future will show as the knowledge economy unfolds remains to be seen, but there is little in the recent historical record to assure policy makers that market forces will deliver a continuing process of convergence to US levels. In such a world the consequences of policy failure or inaction can be dramatic.

**Divergence and concentration.** These same dynamics may cause changes in the industrial structure of knowledge economics. Many contend that increasing inequality can be observed at the international, national, regional, household and personal levels – that the rich are getting rich, while the poor are getting poorer.

Some economists suggest that increasing returns from network economies and learning

economies characteristic of knowledge economies will lead to industrial concentration – a world of winner takes all. Others contend that the expansion of the knowledge driven economy will create a proliferation of material, firms and activities at all points and at all levels, suggesting that no one can expect to enjoy continued control of markets.

There may be temporary monopolies but they cannot last. And it is misconceived to think that the key lies in being at the point of delivery of the product: the low cost and ease of access to the delivery mechanism mean that the rents are driven down at the delivery level and instead migrate back up the value chain to those with genuinely scarce factors and competitive advantages.

Whichever proves true, the knowledge economy will see the development of new business models.

#### **4. What Should Be Done to Meet the Challenge?**

The forces driving the emergence of the knowledge economy are fundamentally reshaping the world economy. This process is proceeding ever more rapidly, and each nation must find its appropriate response to the new economic realities. When the national challenge is viewed from this historical perspective and in the light of the magnitude of the economic and social changes under way, it is clear that four broad types of long-term policy response are necessary.

We need to:

- Drive market-based change with programs to allow, or to force, the economy to respond to the pressures of global competition and to market forces.
- Preserve/build a competitive structure for the future with programs to ensure that the economy retains or develops a strong set of institutions and firms, with a high quality base of human skills and infrastructure, so as to be able to compete in the new economy.
- Manage the adjustment so as to maximize overall growth by managing the adjustment process in such a way as to ensure that pressures of adjustment do not constrain the economy to rates of growth below its full potential.
- Ease the burden of adjustment on individuals, families and regions with programs to support those within the community on which the costs of adjustment fall especially heavily, and to help them to make the transition to the new environment.

Each of these components is essential to an adequate response to the emerging global knowledge economy.

Given the complex dynamics and feedback linkages involved in these things, failure in one respect can have ramifications in another area. For example, opening an economy up rapidly to competitive forces without adequate programs to support domestic firms can denude the economy of long-term competitive capabilities in key industries. If poor macroeconomic management leads to low growth and rising unemployment, or if individuals or communities are severely damaged by structural adjustment without adequate support, community support for market-based reforms may well be damaged. A long-term, integrated response involving all four elements is essential.

#### **5. Outlines of a response**

Over and above these general dimensions for policy action, the characteristics of the emerging knowledge economy suggest a number of immediate and quite specific policy implications, including:



- the increasing inter-dependence among trade, investment, technology and capital flows suggests a need for deep integration of policies in these areas;
- because an economy built on knowledge is fundamentally different from one built on natural resources, we require new approaches to understanding;
- innovation, education and learning underpin a knowledge-based economy. This makes them, and organizing around them, key foci for economic development policies;
- the transformation from a resource-based to a knowledge-based economy involves substantial structural adjustment and requires explicit transition strategies; and
- the role of governments is different in a globalised economy – transformed from that of governance to that of ‘host’ of economic activities.

**The need for policy integration.** The increasing inter-dependence of flows of trade, investment, technology and capital which now characterizes globalization creates the need for far greater coordination and integration of policies relating to them. There is a particular need to integrate trade with investment and technology strategies to ensure that they operate in a manner that is mutually reinforcing. There is also a need to achieve a higher level of integration, a ‘deep’ integration, of domestic and international policies more generally.

**Facing global competition.** Globalization is changing both the level and nature of competition. Policy development must be based on an understanding of the changing nature of competition, global corporate strategies and enterprise capabilities; and consider market support and support for expansion – including fostering and supporting the further development of supply chain linkages, and facilitating outward direct investment (as well as inward).

**Competing on knowledge.** Cost competitiveness is a necessary, but no longer sufficient condition for success. Innovation and knowledge are becoming central to creating and sustaining competitive advantage. We must now deal with the impacts of flexible organization, including the diminished importance of low-skilled labour costs and the increased importance of proximity, networking and cross-cutting forms of organization. And we must focus business programs towards giving more attention to adding value, rather than simply focusing on cutting costs.

**Global investment and production.** Globalization raises a number of investment and locational challenges. The reduction of trade and investment barriers and the global rationalisation of production have changed the motives for location. While there are a number of attributes that are generic to ‘attractive’ investment locations, globalization is creating an additional overlay of attributes relating to industry structures, corporate strategies, corporate structures and cultures. Governments will need to continue to focus on creating an attractive business environment, but this alone will not be enough. Just as it is necessary for firms to master production costs *and* flexible manufacturing to enable them to customize products and services for particular customers, so it is becoming increasingly necessary for governments to flexibly customize investment attraction in such a way as to attract the sorts of investments, corporations, asset ‘bundles’ and cultures that fit with their strategic vision for the economic development of their location.

**Shifting the composition of the economy.** Policy makers increasingly need to attend to the structure of production in the economy, and to consider policies which seek to pro-actively adjust that structure in pursuit of economic and social development. Policy proposals and interventions should be judged against the criteria of structural impact before implementation to ensure that they contribute positively to shifting the structure of production towards more knowledge intensive activities.

Services are increasingly important, and are the locus of much value-adding in the value chain. But, the knowledge economy is not simply a services economy. Our services must be linked intimately with production. With increasing use of integrated computer aided design and manufacturing systems (CAD/CAM), just in time (JIT) and other technologies, and labour and other physical resource costs accounting for an ever smaller proportion of overall costs, the need to integrate research, design, development, manufacturing, distribution and after sales service into seamless chains of creation, production and distribution is likely to increase. We cannot assume that a services economy linked to offshore manufacturing will work. Co-location or deep integration through information and communication technology networks and logistics and distribution networks will increasingly replace arms-length, off-shore, low wage manufacturing. And this has profound implications for investment attraction, structural adjustment, infrastructure development, and skilling.

**Flexible organization.** The successful organization of economic activity is increasingly flexible, network oriented and built through clustering. Translating technological change into productivity gains will increasingly necessitate a range of firm-level organizational changes to increase flexibility – particularly relating to work arrangements, networking, multi-skilling of the labour force and decentralisation. Governments can provide the conditions and enabling infrastructures for these changes through appropriate financial, competition, information and other policies.

**Knowledge, education and skills.** The trend to new strategies and structures referred to variously as 'lean production', the 'knowledge-based firm', the 'high performance organization' or the 'learning organization' is altering the internal structure of organisations and placing new emphasis on the use of teams, a high degree of task integration, decentralised decision making, continuous innovation, organizational learning and the blurring of sites of innovation and production. This is, in turn, transforming workplaces and placing new demands on workers and management.

Policies will need to focus on the development of human capital, the development and nurturing of an entrepreneurial climate, and the promotion of broad access to skills and competencies – especially the capability to learn. This will include: providing broad-based formal education, establishing incentives for firms and individuals to engage in continuous training and life-long learning, and improving the matching of labour supply and demand. What flexible organisations need most from education systems is not so much investment in the production of skilled but narrowly defined specialists, or a lot of investment in vocational training; but much more investment in the production of people with broad-based problem solving skills and with the social and inter-personal communication skills required for teamwork, along with the skills and attitudes required for flexibility.

**An innovation system.** Productivity and growth are increasingly determined by the rate of technical progress and the accumulation of knowledge. Of key importance are networks or systems which can efficiently distribute knowledge and information. Policies relating to science and technology, industry and education will need a new emphasis on the role and importance of innovation systems, the requirement for infrastructures, and incentives which encourage investments in research and training to support those systems.

Globalization presents new challenges for science and technology policy. Technology is increasingly looking like an international public good, making national innovation systems appear increasingly porous. In response to globalization technology policy must shift its focus towards concern for the quality of the workforce, the depth and breadth of new technical knowledge, the culture of entrepreneurship, and the infrastructure for innovation which can

make a location attractive for innovation.

Because of the increasing importance of innovation there is also a greater need for an integrated science and technology policy, which includes full recognition of the shift in focus from invention to diffusion, of the special place of transformative and generic technologies, of embodied technology and the role of imports and investment, of international flows and transfers of technology, and of the need for a deep integration of science policy, investment attraction and focused technology acquisition strategies; and of the importance of chains, clusters and complexes, and integration with regional (locational), supply chain and cluster development strategies. Isolated 'science' policy is no longer appropriate.

How we tackle the challenges raised by the emergence of the knowledge economy will be a major determinant of our future prosperity

## **6. Conclusion**

I think that the knowledge-based economy will provide a huge advantage to the new markets and to the economies from the isolated parts of the world. The Internet is the communication instrument and the source of information that has witnessed the greatest increase in the history of civilization and it might be the instrument with the greatest spreading of all times. The convergence of the informational economy by involving ICT, Internet and electronic trade becomes as important in changes as it is in the industrial revolution. It continues to chance the world economic environment and to change the organizational structures.

The new economy changes the living and working conditions, allowing the surpassing of the existing barriers of the traditional economic development.

The information trade tends to be the difference in overcoming the development limits, real or fictitious. This aspect makes us wonder whether there is a limit of wealth and development, since information is everywhere; it seems to be infinite and to regenerate itself.

From a different point of view, these technologies may lead to the cancellation of the social and geographical barriers, thus allowing people to get in touch and to communicate directly, being at the same time separated by distance, culture and economic stratification.

In this extremely dynamic environment the Small and Medium Business are the ones that have to introduce continuously new products and processes, that will assure their growth on big market segments but only if they have research-development or innovation laboratories.

Smaller firms are oriented towards the customers or market demands, more flexible, in the way that they respond faster to the market changes and they trade faster their innovations.

The competitive advantage of the knowledge-based industry consists in quality of the provided information and the efficiency with which this is gained through its creative reconfiguration in other forms of knowledge. The new industry is supported by telecommunications and technology infrastructure and by personnel trained to use it.

The new economy implies granting an increased interest to the so-called knowledge society, of the employee who has the know-how, the intellectual capital, as well as the learning organizations.

Knowledge as compared to work, land and capital is an asset, which becomes more valuable on the extent of its use. The more it is used the more knowledge becomes more effective and efficient.

A knowledge-based organization may bring about a new entrepreneurial spirit in an organization and it may motivate the top managers to be concerned with the change of the organization in such a way that it becomes capable of capturing, applying and developing the value as a result of the implementation of some efficient technologies.

The knowledge and high technologies may significantly change the economy of a nation. Knowledge together with the information is regarded as competitive thermo-nuclear weapons nowadays. Knowledge is more powerful and valuable than the natural resources and big factories.

For the developing countries that have access to the new technologies, this access to information is remarkably better than they have ever dreamt. The New Economy significantly changes the world.

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