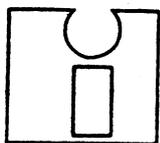


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WORLD INTELLECTUAL
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WIPO-IFIA INTERNATIONAL SYMPOSIUM**

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HOW THE INTERNET AND NEW INFORMATION TECHNOLOGIES INFLUENCE
THE WORK OF INVENTORS, INNOVATORS AND INNOVATIVE
SMALL AND MEDIUM ENTERPRISES (SMES)

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INTRODUCTION

1. The critical role of technology as a driver of economic growth has come to be acknowledged. There is overwhelming empirical evidence that the per capita economic growth of countries is driven by innovations, not by aggregate capital investment per se. Neo-classical economic theory attributed growth in output to an increase in the factors of production, namely, labour and capital. Experience shows that the contribution of raw materials, and in many cases of labour, has declined in providing the competitive edge to the nations. Technology is indisputably the engine of growth.
2. Innovation and creativity are said to differentiate humankind from other species. It is the key for the creation as well as processing of knowledge. The purpose of innovation is to create a new value, be it for individuals, teams or organisations or for the society at large. Value creation could take the form of:
 - A breakthrough of products or services;
 - New strategies;
 - New processes;
 - New methods of organisation.
3. What precisely constitutes innovation is hard to say. It is usually thought of as the creation of a better product or process, but it could just as easily be the substitution of a cheaper material in an existing product or a better way of marketing, distributing and supporting a product or service. Entrepreneurs, usually the most successful, though not only, innovators seldom stop to examine how they do it. "The entrepreneur" said Mr. Jean-Baptist Say, the French Economist who coined the word around 1800, "shift economic resources out of an area of lower and into an area of higher productivity and greater yield."
4. Though the notion of innovation lacks a rigorous definition, the WIPO Model Law for Developing Countries on Inventions (1979) reads as follows: "'Invention' means an idea of an inventor which permits in practice the solution to a specific problem in the field of technology." The Japanese Patent Law is one of the rare laws that contains a definition. It says, that an invention is a "highly advanced creation of technical ideas by which a law of nature is utilised".
5. A nation's ability to convert knowledge into wealth and social good through the process of innovation is going to determine its future. Economics of knowledge, more than mere capital or natural resources, will dominate this century. The changes are truly dramatic. For more than a century the world's wealthiest were associated with oil. For the first time in history, they are now associated with knowledge industries.
6. The nature of what constitutes technology itself is undergoing a major paradigm shift. We define it differently today than we did two decades ago. The emphasis is moving away from physical or tangible assets to intangible knowledge assets. The world's major growth industries – such as microelectronics, biotechnology, designer materials and telecommunications, are the brain power industries.
7. Knowledge, embodied in new ideas and inventions, stimulates even the traditional industries to become knowledge driven. New knowledge in the oil industry in three -

dimensionalacousticalsounding,horizontaldrillinganddeepoffshoredrillingisturningit intoaknowledgeindustry.

8. Tomorrow'ssocietywillbeaknowledgesociety.Tomorrow'smarketswillbe knowledgemarkets.Ithasbeensaidthattomorrow'swarwillbefoughtnotwiththe conventionalweaponsbutwithnewthermo -nuclearweaponscalledinformationand knowledge.

Theimportanceofknowledgeisseeninthevigourwithwhichcompanies protectinfringementsoftheirintellectualproperty.Thetopdamageawards sincethecreationofCAFC(CourtofAppealsoftheFederalCircuit)inthe UnitedStatesisanindicatio nofthechanges:

PolaroidVsEastmanKodak	\$873.2million
SmithInternationalVsHughesTools	\$204.8million
PfizerVsInternationalRectifier	\$55.8million
Shiley,Inc.VsBentleyLaboratories	\$44.8million

9. Thelegalprotection ofintellectualprotectionhasspreadtoanumberofdeveloping nations.Theideathatintellectualpropertyisanasset,withdefinitecommercialvalue,is growinginsignificantly.AttitudestoIPareshifting.

10. TheadventoftheInternetan drelatedtechnologies,linkedwithchangesin telecommunications,hasthrownupnewopportunitiesandhasbroughttheimportanceofsize incompetitivenessofthefirmsintoquestion.TheeconomicimpactoftheInternethasoften beendescribedasanoil shockinreverse.Thejumpinoilpricesinthe1970sincreased inflationandpushedtheworldintorecession.TheInternetreducesthecostofanotherinput information,andsohaspositiveeconomiceffects.

11. Iwishtofocusinthispresen tationonthelinkagesbetweeninnovationandthe emergenceoftheInternetandnewinformationtechnologiesandthewaytheseprovidea competitivedge,particularlytothesmallandmediumenterprises(SMEs).

THECOURSEOFTECHNO LOGYDEVELOPMENT

12. Understandingtheeffectsoftechnologicalprogressoneconomicgrowthwas spearheadedbytheAustrianeconomist,JosephSchumpeter,bestrememberedforhisviews onthe“creativedestruction”associatedwithindustrialcycles50 -60yearslong.H ewasthe firsttochallengeclassicaleconomicsasitsoughttooptimiseexistingresourceswithin a stableenvironment.Ahealthyeconomy,asheobserved,wasnotoneinequilibrium,butone thatwasconstantly“disrupted”bytechnologicalinnovation. Thecycleof“longwaves”is unique,drivenbyentirelydifferentclustersofindustry.

13. Alongupswinginacyclestartswhenanewsetofinnovationscomesintowide -spread use.This happened,inthelate18th centurywithwaterpower,texti lesandiron;inthe

mid 19th century with steam, rail, and steel; and at the turn of the 20th century, with electricity, chemicals, and the internal combustion engines.

14. These long boom periods petered out as technologies matured and return to investors declined with reduced numbers of opportunities. After a period of slow expansion, inevitably came the decline – only to be followed by a wave of fresh innovations, which destroyed the old way of doing things. Conditions were recreated for a new upswing.

15. By the 1950s, the third cycle of these successive industrial revolutions had already run its course. The fourth, powered by oil, electronics, aviation and mass production is winding down. There is evidence that a fifth industrial revolution based on semi-conductors, fiber optics, genetics and software, is not only well underway but has, possibly, run two-thirds of its course and may be approaching maturity. The long economic waves are shortening from 50-60 years to around 30-40 years.

16. Government and companies pre-occupied with preserving their fourth-wave industry may find themselves as laggards. Catching up with these waves of technological changes required Governments to free-up their technical and financial resources, creating an enabling legislative and enforcement framework and investment in the new infrastructure. Organisations had to build innovations in their company cultures.

17. Before we come to the developments of the Internet and their influence on SMEs, we should look at the changing paths in technology developments. Over 50 years ago, before World War II, the driving force for innovation was the search for knowledge – individual and organisational. Scientific research work was pursued by the few small enterprises. Little interaction existed between academics and industry.

18. World War II and the years thereafter, witnessed the emergence of Government-funded research, driven by the demands of economics, defence and health. Science-based industries, such as biotechnology and information technology grew. There was also growth of industrial scientific research. Industry support to academia was intense.

19. After the Cold War, defence-based science and technologies declined. Economic growth and health became prime movers. Serious questions have been raised of flat to driving innovation through defence and space spending and hoping for its subsequent diffusion into society through technology “spinoffs.”

20. The process of globalisation has also given rise to privatisation and corporatisation of innovation effort. As these have grown, the issues of ownership of intellectual capital and proprietary information began to assume greater importance. The Uruguay Round (1986–94) under GATT and the subsequent emergence of the World Trade Organization (WTO) in 1995, brought the issues of intellectual property rights to the forefront.

PATHS IN INNOVATION

21. If we examine the different roads to innovation, three approaches become visible:

- The first is innovation on a large scale. They take the form of strong social and economic commitments, like building pyramids or a man on the moon. They became the crucibles of innovation creating challenges to innovations and integrating technologies,

people, systems, organisations and methods. These require visionary leaders and resources which usually the nation's states have at their command. Strategic programmes in space, defence, agriculture, and atomic energy represent such large-scale innovations. These are fired by dreams and great ambitions, and by denial as in the case of war or sanctions.

- The second kind is the incremental innovation. The process of technology development at the operations level is driven by competitive forces. They lead to the influx of improved products and services. The number of patent applications in the world each year is estimated to be well over one million. Those applications result in the granting of over half a million patents. The number of patent documents since the time when patents were first published is close to 30 million. Of course, not all inventions are taken to patent offices. The point is, that at the grass-roots level – at the firm or the individual level – the innovative activity is very intense. The heart of competitiveness lies in the human endeavour to excel and in continuous innovation to develop superior products, in terms of quality, features, design, content and service that satisfy the end-user.

- The third type of innovation arises through major breakthroughs. They give rise to altogether new industries. Telephones, x-rays, photography, xerox, jet engines and stereo sound are some examples of radical innovations. Often, they come about by serendipity. Many products in the chemical, plastic and antibiotic industries came about by accident. People usually call them 'lucky accidents'. But it requires an inquisitive mind to spot them. Eyes do not see what the mind does not know.

22. True innovation comes from those who are motivated to break the status quo. They direct their energies to make things happen. Their urge is to move the frontiers of understanding and to improve. In the words of the English poet, Lord Alfred Tennyson (1809–1892), “*To strive, to seek, to find, and not to yield*” (Ulysses). Innovator leaders set stretched targets.

23. Innovations not only break the mould, they also yield far better returns than ordinary business ventures. One American study found that the overall rate of return for some 17 successful innovations made in the 1970s averaged 56%. Compare that 16% average return on investment for all American business over the past 30 years. Innovators with good ideas and a track record, with all the riskiness of their endeavours, attract investments.

The Chairman of 3M said in 1993 that 25% of its sales would be based on the innovation of 3M carried out during the last 5 years. He increased the challenge by changing this from 25 to 30% and from 5 years to 4 years.

Technical staff at 3M are encouraged to spend 15% of their time working on ideas they hope will one day become new products for their company. They not only get time to pursue these ideas, they can also get money to buy equipment and even higher extra help.

24. It has been said that if a man makes a better mousetrap, the world will make a beaten path to his door. Inventing a better mousetrap is the easy part; the hard bit is innovating, which takes time, money, access to markets and insight. Perhaps we should, more appropriately, put it another way: “If you come up with a unique effective pest control service, investors will flock to support you.”

25. We need to create conditions which will nurture leaders who are visionaries and thinkers, who believe in discontinuities, who are capable of thinking of the impossible and inspiring people to make it happen. It is been recognised that the enabling environment to induce, encourage and sustain innovation need to be created increasingly in the small and medium operations.
26. A surprisingly large number of Silicon Valley companies in California, USA, have been founded by expatriate Indians or Chinese. If countries are to spawn their own high-tech culture, they have to foster it and keep innovators and then the new breed of 'technopreneurs',
27. Today, America gets more than half its economic growth from industries that barely existed a decade ago – such is the power of innovation, especially in information technologies.

INFLUENCE OF THE INTERNET AND THE NEW INFORMATION TECHNOLOGIES

Web for Business

28. A growing number of SMEs are leveraging their advantages with the enabling power of the Web. It is not that they are rushing into it because E-ventures are where the opportunities are. They are systematically extending their corporations from 'Brickworld' to 'Clickdomain'. It has been said that, in five year time, all companies will be Internet companies, or they won't be companies at all.
29. Internet is helping companies to lower costs dramatically across their supply and demand chains, enter new markets, create additional revenue streams and redefine their business relationships. Entirely new companies and business models are emerging to take advantage of new possibilities.
30. In laying the foundation of this extension, there are three important factors to consider:
- *First*, it is necessary to understand the nature of the Internet. It is, essentially, to disseminate information, target specific audiences, and to generate direct responses. It is not simply because it places information on businesses on-line but because it can take advantage of its unique interactive nature;
 - *Second*, while laying the foundation of the Internet and the corporate Intranet one must understand the competitors' presence on the Web. This means the awareness of the brands and the products competitors are focusing upon, their promotional plans, their target audience and how they are reaching these targets;
 - *Third*, the Web provides an opportunity to experiment and learn at the same time. The success of the Web lies in its ability in adapting to improvise a new business plan by finding out in real-time ideas that those are commercially viable and those that are not. It helps create virtual marketplace.
31. Economists suggest that the new economy should be called the "nude economy" because the Internet makes it more transparent and exposed. It makes it easier for buyers and

sellersto compare prices. It cuts out the middlemen between firms and customers. It reduces transaction costs and it reduces barriers to entry.

32. Universality of the Web makes it possible not only to go global reach but also to seamlessly integrate various business operations. Different products and services are coming together on the Web to provide integrated services for the customer, thus gaining the marginal business they would otherwise not have access to. Airlines, hotels and car rental companies have been quick to exploit this potential.

33. The “New Business Ecosystem” as it is called, arises out of new and symbiotic relationships between companies which provide mutual business. ‘Co-opetition’ is the emerging strategy where suppliers offer complimentary services in specific instances, even though they are otherwise competitors.

Even businesses which were quite efficient before they started using the Internet, such as Dell Computer’s factory on the outskirts of Limerick, on the West Coast of Ireland, are doing even better by creating a ‘fully integrated value chain’. The Internet’s universal connectivity has enabled it to create a three-way “information partnership” with its suppliers and customers by treating them as collaborators who together find ways of improving efficiency across the entire chain of supply and demand, and share the benefits.

34. As a consequence, we are now witnessing the emergence of altogether new business opportunities “re-intermediation”: a resurgence of brokers who can search the Web for the best opportunities or put together an optimum package based on products and services from a number of suppliers.

35. Using the Web for business means taking a hard look at your customers, your operations, your suppliers, indeed partners and reorganising yourself. It is about getting to your core competencies and providing products and services through new channels. For many companies this may well be the greatest opportunity to excel.

36. There are new issues relating to the laws governing the Internet and of intellectual property rights. These are being addressed at national and international levels.

37. In the words of Larry Carter, Chief Officer of Cisco Systems, a company that sells about 80% of the routers and other forms of networking equipment that power the Internet, “It’s no longer about the big beating the small. It’s about the fast beating the slow.”

E-commerce

38. Trade between businesses makes up more than 70% of the regular economy. Business to Business (B2B), E-commerce dwarfs Business to Consumers (B2C) variety.

39. A recent study by Merrill Lynch puts B2B E-commerce sales at \$157 billion in 1999 vs. only \$22 billion for B2C. The B2B is expected to grow to \$2.5 trillion by 2003, about 5% of global GDP and more than 10 times the amount of E-commerce that consumers are expected

to generate. Of this, some \$500 billion is likely to pass through Web marketplaces, to create new industries with earnings in the range of \$25 billion per year.

40. In the short -time frame where it has taken the phrase “B2B” to enter the vocabulary more than 750 such business -to-business markets have sprouted around the world.

41. B2BE -commerce cuts company’s costs in three ways:

- *First*, it reduces procurement costs, making it easier to find the cheapest supplier and cutting the cost of processing transactions;
- *Second*, it allows for a better supply chain management;
- *Third*, it makes possible lighter inventory control, so that firms can reduce their stocks or even eliminate them.

- ◆ A recent study reports that firms’ possible savings from purchase over the Internet vary from 2% in the coal industry to up to 40% in electronic components.
- ◆ British Telecom claims that procuring goods and services online will reduce the direct costs of processing a transaction by 90% and reduce the direct cost of goods and services it purchases by 11%.
- ◆ In the USA, a transfer between bank accounts costs \$1.27 if done by a bank teller, 27 cents via a cash machine, and only one cent if done over the Internet.

42. The longer the supply chain, the bigger the potential gains from B2BE -commerce, since it allows the firm to eliminate the many layers of middle ment that hamper economic efficiency.

43. Web marketplaces fall into three broad categories:

- **Online Catalogues:** They simply gather catalogues of all the suppliers in a given industry and put the resulting ‘Meta catalogue’ online;
- **Auctions:** Of fer a mechanism to negotiate prices. They are in the form of conventional set -up to help the seller get the best price. More often, they are ‘reverse auction’ where suppliers compete by bidding lower prices;
- **Exchanges:** Offer constant price adjustments as supply and demand rise and fall.

44. Tapping into the flow of information and commerce between companies will be a real competitive advantage for the SMEs. Large companies who cannot manufacture or provide services all on their own are driving a hard bargain. They are also setting up their own procurement hubs or direct sales’ websites rather than through independent exchanges.

As an example, GE through the GE Polymer Land website, sells \$10 million in Plastics a week online – up from \$10, 000 a week at the beginning of 1991. Polymer Land also delivers some useful features to its customers. Industrial designers, logging onto this website can select a plastic, decide on a shape, determine its strength or heat resistance and compare prices among dozens of types of plastic. Then, pick up the colour from the 10,000 available and, two days later receive a colour sample chip in the mail. The website is not just cutting distribution costs – it is making it easier for its customer to design products.

45. Internet exchanges have already gone through three phases:

- The first saw firms such as General Electric and Wal-Mart, moving buying and selling online – in order to cut costs and speed supplies;

- Next came third party exchanges in dependence of firms to bring together many sellers and buyers to create a genuine market;

- We are now in the third phase when industry leaders, often competitors, get together in consortiums. In February 2000, General Motors, Ford, DaimlerChrysler, abandoned their stand-alone efforts and joined hands to create the world's largest virtual market. It will buy \$240 billion worth of parts from tens of thousands of suppliers. A number of alliances in the auto industry, chemicals, retail trade and agriculture have since been announced.

46. The flexibility inherent in the Web marketplace is actually leading to the creation of markets that never even existed.

47. Within particular industries, companies are moving at different speeds. Much depends on the competition they are exposed to. The competition is not only from traditional rivals but also from Internet-based newcomers. Recent experience has shown that it takes a little more than two years for new start-ups to formulate innovative business ideas, establish a web presence and dominate its chosen. By then it may be too late for the slow-moving traditional businesses to respond.

Communications & Multimedia

48. For about a century, after its birth, the telephone network became more and more extensive but not much more sophisticated. Only in the past two decades or so have we had three great innovations – the fax, the mobile telephone and the Internet, which have shown how the network can be used to create new mass-market products that change the way people live and work.

49. Communications are at the center of the most intense innovation industry has ever seen. Its closest analogy is of the many ways the electrical power shaped the 20th century.

50. In many countries telephone services are still closely held public sector monopolies. These are being swept away as agreed by the World Trade Organisation (WTO). Impelled by

a combination of liberalisation and technological innovation, this sector will change beyond recognition in the next five years.

If you want to see what competition can do, go to Finland. It has the world's highest ownership density of mobile telephones; the world's highest Internet penetration; and more public pay -phones per head than anywhere else in Europe.

In a country with a population of around 5 million, many of the largest companies have two network providers. People can choose between a fixed -line provider and several wireless services. It has 52 local companies, which benchmark their services against each other.

In 1997, telecommunications licensing was abolished. Anybody who wants to run a telephone service simply notifies the telecommunications ministry and accepts a number of obligations (such as providing access to emergency services).

51. The ascent of the mobile in some developing countries is even more remarkable. In Cambodia, 60% of all telephone subscribers use mobile cellular. Fixed -lines account for only 25% and fixed wireless for the rest. In several other Asian countries, such as the Philippines, Sri Lanka and Thailand - more than 20% of all subscribers have cellular telephones. By 2001, 415 million of the world's 1.4 billion telephones, will be mobile. Competitive pressures are making prices fall.

52. The fusion of developments in telecommunications, computers and software are providing new possibilities to SMEs to access markets and opportunities which were not possible earlier. It is reducing trade barriers and creating a new infrastructure.

53. A key benefit of the Web is that it offers low -cost access to many sources of information and many types of data -text, audio, video and graphics. Data types and relationships are beyond the technical capabilities of relational databases. Recent developments are bringing the multimedia into the mainstream of business applications. Animation and virtual reality are emerging tools to further sharpen the competitive edge of enterprises.

54. High-bandwidth connections are linking most appliances to information highways. An increasing number of devices are connecting wirelessly. Wireless Applications Protocol (WAP) enabled cellular phones linked to palm tops are providing point of sales inventory management systems and greatly reducing cycle times and labour costs.

55. Taking advantage of high -speed data transfer technologies, forthcoming mobile phones will display texts and also receive sound and video clips at the same time 3G (3rd Generation) networks and are scheduled to go live in 2002. Hopefully, they will be switched on for the World Cup. The new devices are likely to be called not phones but communicators.

Rapid Prototyping

56. Those who reach markets with their product first, enjoy great advantages in terms of leaderships, market share, and consumer loyalty. Increasing global competition is forcing manufacturers to create better products in less time and at the same time ensuring a tight control over the costs at each stage of product development - from concept, to design, tooling, and actual production.

57. The technology which guides the product from concept to market quickly and inexpensively, by comprehensively reducing the product development cycle is rapid prototyping (RPT). It creates a physical object (prototype) directly from the computer model data.

58. It is a set of processes that involve computer-aided design (CAD), solid modelling, ultra violet/laser technology and layer-by-layer prototype fabrication. It uses assorted materials such as plastics, ceramic and metal powders, sheet materials and binders through special techniques of sintering, layering and deposition techniques. Geometrically complexities, textures and shapes not handled by conventional methods can be easily handled through RPT.

59. Developments in the new information technologies have made flexible manufacturing possible. It helps us greatly compress the concept to market time cycles and allowed us both standardisation and flexibility at low cost, not possible with conventional methods. The concept of 'economy of scale' is being transformed into an ideal best expressed as 'economy of variety'.

- ◆ Mercedes can offer 102,345 variations of cars within an annual production volume of 150,000, at its Bremen factory.
- ◆ At Nissan, while annual production volume rises slowly from 2.1 million in 1975 to 2.4 million in 1990, the number of car models and body types rose to from 11 models and 22 types in 1975 to 27 models and 54 types in 1990.
- ◆ The national bicycle industrial company in Kokubu, Western Japan, makes one-of-a-kind by replacing mass production with flexible manufacturing. With 20 employees and a computer capable of design work, this small factory can produce any of 11,231,862 variations on 18 models of racing, road and mountain bikes in 199 colour patterns and about as many sizes as there are people. Production does not start until a customer places his order, but within 2 weeks she/he is riding one of a kind bicycle.

60. The advances in information technology are thus going beyond the Internet and E-commerce. They are helping us through developments in rapid prototyping and flexible manufacturing, to gain a competitive advantage at the level and size of operations, which are suited to SMEs.

IMPACT ON SMALL AND MEDIUM ENTERPRISES (SMES)

61. The advantages of cost and of generating innovative ideas have given rise to an increasing number of small and medium enterprises (SMEs). Outsourcing has increased leading to the reduction of large conglomerates. The SME sector in India contributes 35% of its output to the manufacturing sector, employing 15 million people second only to agriculture and over 40% of total exports, making it one of the most vibrant sectors of the economy.

62. The history of the Silicon Valley is full of stories of SMEs, being the driving force of growth and innovation. The German economic miracle after World War II is largely the result of the enormous success of its SMEs. In India, about 60% of companies registered with the software technology parks are SMEs.

63. Economist, Ronald Coase, argued way back in 1937, that the main reason why firms exist is to minimize transaction costs. Since the Internet reduces such costs, it also reduces the optimal size of such firms. Small firms can buy services from outside more cheaply and barrier to entry, based on size alone, fall.

64. The progression of many large companies up the value chain is creating in its wake, an increasing number of SMEs. The Internet and all the attendant changes that it brings along with it, means for the first time SMEs developing product is more cost effective. Sharply reduced communication costs are rendering distances irrelevant, opening up opportunities for SMEs to offer cost-effective solutions all over the globe.

65. The Internet, coupled with the advent of the WTO's lowering of the tariff walls further level the playing field. In combination, they provide a strong base for SMEs. Echoing Coase's theory, Economist Andie Xie, at Morgan Stanley, in Hong Kong, argues that because the Internet cuts transaction costs and reduces economies of scale from vertical integration, it reduces the economical size of firms. One big advantage rich economies have - their closeness to wealthy consumers will be eroded as transaction costs fall.

For example, smaller firms in emerging economies can now sell in global markets. It is now easier, for instance, for a tailor in Shanghai to make a suit by hand for a lawyer in Boston or software designer in India to write a programme for a firm in California.

CONCLUSION

66. The Internet offers a new information system, a new marketplace, a new form of communication and a new means of distribution. The power of digital distribution has the power of leading to development wholly new products and services, that nobody has imagined, offering the hope of further increases in economic growth.

67. The prices of computers and telecommunications have fallen more rapidly than for any previous technology in history. The recent rise in American productivity may be a payoff of the computer revolution, which started fifty years ago with the invention of the transistor. It

took decades before many developing countries benefited from railways, telephones or electricity. In contrast, with the Internet and the new information technologies now diffusing extremely rapidly throughout Asia, Latin America and Eastern Europe, the process of economic catch-up would be speeded up. The reward to other economies could be even bigger.

68. The Internet and new information technology are influencing the work of inventors and innovative SMEs in ways that are as far-reaching as the earlier industrial revolution. An increasingly networked world is not just changing the way people work with each other. It is also giving rise to new opportunities. The new technologies, driven by innovation, make an unprecedented degree of collaboration possible, rapidly giving rise to new business alliances and federations.

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