

GLOBAL ICT DEVELOPMENT- MEASURING ICT'S ROLE IN BRIDGING DIGITAL DIVIDE AND FOSTERING ECONOMIC DEVELOPMENT

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ABSTRACT

The most striking development in the globalization era has been the Information and Communication Technology (ICT) invasion. Seemingly it has turned the world into a global village. Wireless Engineering, E-governance, Infinite access and endless connectivity have all turn out to be the new ICT buzzwords. ICTs continue to be diffused at a rapid rate all over the world. There are impressive statistics and other evidence to prove that ICTs do make a difference to the competitive and comparative advantage of nations, organizations, communities and people. A study claims that ICT diffusion accounts for up to 90 percent of the increase in the Human Development Index (HDI) observed in some nations. It is clear that ICTs have an important role to play in fighting poverty and in achieving the Millennium Development Goals. But the question arises when the benefits of ICT have not been able to keep a pervasive and sustaining effect all over the world resulting imbalance, which is termed as "Digital divide." While some nations have been able to rise at the peak of advancement others still remain at the dark cave of poverty, hunger and fallacy. However to state the exact amount of discrimination between developed and underdeveloped countries it is required to measure the progress or the magnitude of development. Once we can measure it properly only then we can concentrate on it with appropriate solutions which may ultimately help to eradicate the digital divide and also suggest path's of economic growth and development.

INTRODUCTION

It is frequently believed that ICTs are pivotal in rebuilding and re-constructing a globally networked economy. In recent years, considerable attention has been paid to the role of ICT, in promoting development, therefore bridge the digital divide. With these important implications, it is not surprising that the connection between the expansion of information communication technologies and economic development is currently receiving considerable attention by practitioners, policy makers, and researchers and funding organizations. Efforts to agree on the most appropriate indicators to use for measuring disparities in information and communications technology (ICT) adoption and progress toward information society goals have continued in 2008. However as yet global consensus has not been reached and debate continues over what indicators would best take into

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account the growing broadband divide, what constitutes “universal access”, and how to accommodate local realities regarding data availability, especially in developing countries. Partially because of its complexity, experience in empirically defining this relationship between ICT and economic development has proved to be significantly difficult and challenging. Efforts to bridge the digital divide that focus on using ICT to stimulate or augment economic and human development has become an ever ending human endeavor for so many researchers, institutions and govt. organizations. International development agencies have supported, and participated in, this mounting enthusiasm for ICT-led growth and poverty reduction by helping developing countries prepare and implement “national ICT strategies” or “e-strategies” designed to integrate ICT into broader national development and poverty reduction plans. But “sustainable development” is yet a term, which has been found quite existent, as we look to the underdeveloped countries of the world.

This paper consists of a theoretical discussion and an analysis of global ICT developments measurement based on various indicators. It will address the concept of Digital divide and also some effective guidelines will be discussed that may help to show the path’s of bridging the Digital divide and also foster economic progress.

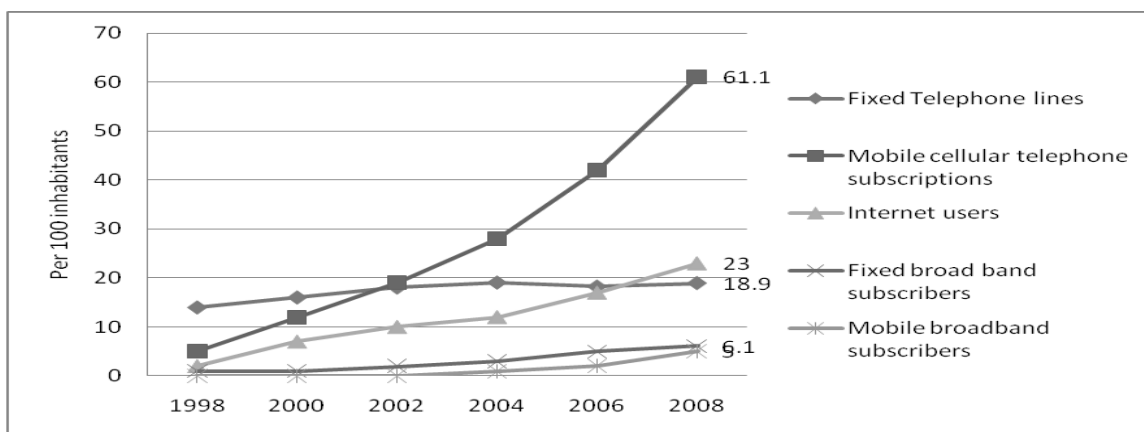
Diffusion of ICT Globally:

In the last couple of decades the world has observed the greatest possible diffusion of ICT all over the world, which is almost beyond our thoughts. With the magic touch of ICT human race have been able to accomplish so many things that were earlier beyond our wildest imagination. By the end of 2008, an important milestone in the ICT development race was achieved: over 4 billion mobile cellular subscriptions worldwide, translating into a penetration rate of 61 percent. At the same time, quarter of the world’s 6.7 billion people was using the Internet.

The below chart shows the global ICT development based on various components of ICT used by individual persons. From the chart we can see that mobile cellular telephone subscriptions have achieved a highest peak of all the other components. Moreover, the growth rate is very high and steady and at the same time number of Internet users have also raised quite steadily.

Global ICT Development 1998-2008

Figure: 1



Source- ITU ICT indicators database-2009

However, despite high growth rates, record numbers, and all high penetration rates, major differences in ICT levels between regions and between developed and developing economies remain. Given the wide-range of potential benefits ICT can offer communities in terms of development, countries strive to make ICT available all most in all the sector i.e. education, commerce, governance, health etc.

The strong influence of ICT in shaping the process of globalization, particularly in the productive, commercial and financial spheres, is widely recognized. That the benefits of the applications of ICT to economic activity have so far accrued largely to developed countries and to a group of a few relatively advanced developing countries is also generally admitted. At the same time, there is broad consensus that ICT have the potential to contribute significantly to the social and economic progress of the majority of developing countries. ICT can be used to enhance the effectiveness of policies and measures addressing most of the major problems of development, including those concerning the productivity and hence the competitiveness of the enterprise sector of developing countries.

Despite all the international activity around the concept of “ICT for development”, the treatment of the economic implications for developing countries of the diffusion of ICT remains less advanced than that of other development issues. Yet it is the application of ICT to the activity of developing-country enterprises – in their purchases of inputs and management of resources, in their productive, marketing and financing activities – that will enable ICT to make a larger impact on these countries’ capacity to compete in international markets (or to face up to competition in their domestic ones) and to generate growth and employment.

Measuring Global ICT development: Background

Given its revolutionary power and possibilities in fostering social, economical and global development role of ICT, it is necessary to measure the ICT growth status and requirement on a country specific basis. The measurement of any countries ICT achievements and the development with those of others is an important benchmark to assess global competitiveness, which provides motivation to deploy policies that enhance ICT development. Therefore the effort of benchmarking ICT policy has been a continuous process maneuvered by different associations, organizations.

In 2003 a conference held in Geneva named WSIS (World Summit on Information Society) which outlined the basic requirement of global ICT development measurement, indicators that measure ICT growth, benchmarking progress of ICT to develop a country to information society. The leaders and stakeholders of various countries and organizations participated in the summit and few issues were agreed upon mutual consent. A Global partnership for measuring ICT development was established. The Partnership was officially launched during the UNCTAD XI conference held in Brazil in June 2004. Following are the organizations that are the members of this global partnership on measurement of Information Society.

❑ International Telecommunication Union (ITU) ❑ The Organization for Economic Co-Operation and Development (OECD) ❑ Eurostat ❑ The United Nations Conference on Trade and Development (UNCTAD), ❑ The UN ICT Task Force ❑ Four UN Regional Commissions (UNECA, UNECLAC, UNESCAP and UNESCWA) ❑ The UNESCO Institute for Statistics (UIS) ❑ World Bank

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The main objectives of the Partnership are the following:

- To agree on a common set of core ICT indicators those are comparable at the international level;
- To assist in building the statistical capacity in developing countries, and
- To set up a global database for hosting data on core ICT indicators.

To achieve these objectives, the respective partners have combined resources and coordinated activities related to measurement of the information society.

The partners of ICT measurement assumes that the Developing countries will have the capacity to launch programs for the collection of official ICT statistics, which will be comparable at the international and regional level. This will be essential for their abilities to take informed decisions on ICT policies and strategies, to identify priority areas for policy action, to monitor, assess and revise national ICT strategies, or

to benchmark national economies vis-à-vis those of other countries. As a result of the Partnership, developing countries will be able to maintain readily available data on ICT access and usage by the business, households and other sectors and to develop indicators that are internationally comparable.

Regional e-measurement networks will be established, to advance the development and collection of indicators for the information society in the respective region. They would be comprised of representatives of national statistical offices or other entities responsible for e-measurements at the national or regional levels. The regional networks would advance the work on developing ICT indicators and methodologies, to be brought forward in international forums dealing with information society indicators. The results of the Partnership would also contribute towards the collection of internationally comparable ICT indicators that could be used for monitoring the Millennium Development Goals (MDGs).

Of the organizations that have initiated ICT measurement some are mentioned here to get a clear picture regarding the measurement parameter:

ICT Development Index:

One of the very prominent partners in measuring ICT development is ITU (International Telecommunication Union). This institution has been continuously working onto the analysis and measurement of the various components of ICT around the globe. To measure the present ICT development world-wide ITU has developed an Index, which is called **IDI** (ICT Development Index).

IDI is aimed to accomplish the following objectives:

- The development of ICT in countries and relative to other countries (i.e. track ICT progress *over time*).
- The level of advancement of ICT in *all* countries (i.e. the index should be global and reflect changes in both developed and developing worlds).
- The *digital divide*, i.e. differences among countries with different levels of ICT development.
- The *development potential* of ICT or the extent to which countries can make use of ICT to enhance growth and development, based on available capabilities and skills.

To develop the IDI it requires a three-stage evolution model which takes any country towards an Information society, which was one of the major targets of WSIS conference.

- Stage 1: ICT readiness, reflecting the level of networked infrastructure and access to ICT,
- Stage 2: ICT intensity, reflecting the level of use of ICTs in the society, and
- Stage 3: ICT impact, reflecting the result of efficient and effective ICT use.

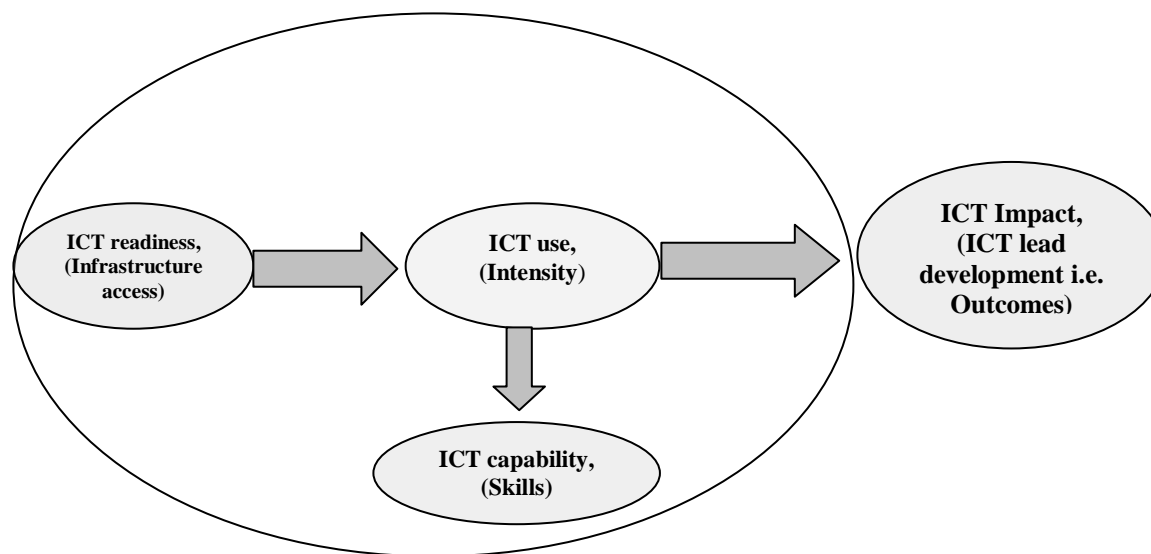


Figure: 2 Three stages in the evolution towards an information society(Source: ITU Report 2009)

ICT readiness, Infrastructure and access: The ICT readiness reflects the access to ICT infrastructure. This is the very pre-requisite to measure the ICT development status as it gives a clear picture of the diffusion of ICT at the national and regional level. There are some indicators which manifests the level of ICT infrastructure of any country:

1. Fixed telephone lines per 100 inhabitants
2. Mobile cellular telephone subscriptions per 100 inhabitants
3. International Internet Bandwidth (bit/s) per Internet user
4. Proportion of households with a computer
5. Proportion of households with Internet access at home

ICT intensity: ICT intensity refers to ICT use, which indicates the level of absorption of the technologies. During the ICT use stage, countries increase their use in terms of numbers (i.e. more users of a specific ICT) and in terms of level of intensity (for example, more SMS being sent) and sophistication of use (for example, online banking or purchasing). This could vary considerably between ICTs and countries. For example, mobile phone use can be very intensive in developing countries, with relatively sophisticated applications such as m-banking and m-commerce, while Internet use can still be limited to e-mail. The best known example is the Philippines, with the highest numbers of SMS per subscriber globally. At the same time, bandwidth – which is necessary to use more sophisticated Internet-based applications – may still be limited.

The following indicators reflect the ICT intensity:

- ➔ Internet users per 100 inhabitants ➔ Fixed broadband Internet subscribers per 100 inhabitants
- ➔ Mobile broadband subscriptions per 100 inhabitants

ICT skills: ICT skills are needed to make best use of ICTs. They are critical to the potential impact that ICTs can have on development, in particular the achievement of value added from ICT use. If countries are not capable to exploit the new technologies and realize their potential benefits, development and progress will be hampered. ICT impact therefore largely depends on the availability of skills and knowledge and the capability to use ICTs efficiently and effectively. ICT capability or skills are therefore an indispensable input measurement required to achieve maximum ICT impact. ICT skill level can be measured by:

➔ Adult literacy rate ➔ Secondary gross enrolment ratio ➔ Tertiary gross enrolment ratio

ICT impacts: The combination of the above factors finally reflects the outcomes that are in action for a country.

The overall objective of the IDI is to benchmark ICT progress among countries at the global level. Therefore, the indicators included in the index were chosen based on their availability for as many countries as possible. Since data availability in many developing countries is poor, it is a major limiting factor to the construction of a global index. As a result, the index is broad in nature, and relies on proxies for certain indicators.

OECD, ICT measurement indicators:

One of the partners of the ICT measurement alliance is OECD, Organization for Economic Co-operation and Development which is working toward economic co-operation and development of its member countries. For more than 40 years, OECD has been one of the world's largest and most reliable sources of comparable statistics and economic and social data. As well as collecting data, OECD monitors trends, analyses and forecasts economic developments and researches social changes or evolving patterns in trade, environment, agriculture, technology, taxation and more. At present OECD have 30 members which are:

Australia, Austria, Belgium, Canada, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Japan, Korea, Luxembourg, Mexico, the Netherlands, New Zealand, Norway, Poland, Portugal, Slovak Republic, Spain, Sweden, Switzerland, Turkey, United Kingdom, United States.

In its various publications and databases produced by the OECD's Directorate for Science Technology and Industry (DSTI). It has identified 15 indicators that help to measure ICT condition of any country (Listed in **Table 1**). This list contains almost all the technological aspects of development that ICT can offer but the list is mainly aimed at the OECD countries. Items mentioned in the list are mostly based on assumptions which are available in the OECD member countries.

Table-1. OECD ICT Indicator list

1	Access lines and access paths in total / per 100 inhabitants for OECD, 2005
2	Mobile subscribers in total / per 100 inhabitants for OECD, 2005
3	Internet subscribers in total for OECD
4a.	Broadband subscribers per 100 inhabitants in OECD countries
4b.	Availability of Digital Subscriber Lines (DSL) in OECD countries

- 5 Cable TV subscribers in total for OECD
 - 6a. Households with access to a home computer
 - 6b. Households with access to the Internet in selected OECD countries
 - 6c. Households with access to broadband in selected OECD countries
 - 7a. Internet penetration by size class, 2007. Percentage of businesses with ten or more employees using the Internet
 - 7b. Internet selling and purchasing by industry
 - 8a. Share of ICT-related occupations in the total economy in selected countries, narrow definition
 - 8b. Share of ICT-related occupations in the total economy in selected countries, broad definition
 - 9a. Telecommunication services revenue in total for OECD
 - 9b. Mobile telecommunication services revenue in total for OECD
 - 9c. Telecommunication infrastructure investment in total for OECD
 - 10a. Share of ICT value added in the business sector value added
 - 10b. R&D expenditure in selected ICT industries
 - 10c. Share of ICT employment in business sector employment
 - 11a. ICT-related patents as a percentage of national total (PCT filings)
 - 11b. Share of countries in ICT-related patents filed under the PCT
 - 12 Trade in ICT goods
 - 13 Top 50 telecommunications firms and IT firms
 - 14 Contribution of ICT-using services to value added per person engaged
 - 15 Contributions of ICT investment to GDP growth
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Revised ICT development measurement Indicators:

In the area of ICTs, constant technology and market change has meant that until recently there was little global agreement on an appropriate set of indicators or indices. However, in the year 2005 the partners of global ICT measurement agreed on some common set of indicators. The first version of the core list included 41 core ICT indicators in four groups as follows:

- ICT infrastructure and access → Access to, and use of, ICT by households and individuals,
- Use of ICT by businesses → The ICT sector and trade in ICT goods.

The lists are presented in Table 2, 3, 4 and 5 as follows

Table: 2: ICT infrastructure and access

1. Fixed telephone lines per 100 inhabitants
2. Mobile cellular telephone subscribers per 100 inhabitants
3. Fixed Internet subscribers per 100 inhabitants
4. Fixed Broadband Internet subscribers per 100 inhabitants
5. Mobile broadband subscribers per 100 inhabitants
6. International Internet bandwidth per inhabitant (bits)
7. Percentage of population covered by mobile cellular telephony
8. Fixed broadband Internet access tariffs (per month), in US\$, and as a percentage of monthly *per capita* income
9. Mobile cellular prepaid tariffs, in US\$, and as a percentage of monthly *per*
10. Percentage of localities with public Internet access centers (PIACs) by number of inhabitants

Table: 3. Core indicators on access to, and use of, ICT by households and individuals:

1. Proportion of households with a radio
2. Proportion of households with a TV
3. Proportion of households with a fixed line telephone
4. Proportion of households with a mobile cellular telephone
5. Proportion of households with a computer
6. Proportion of individuals who used a computer (from any location) in the last 12 months
7. Proportion of households with Internet access at home
8. Proportion of individuals who used the Internet (from any location) in the last 12 months
9. Location of individual use of the Internet in the last 12 months: (a) at home; (b) at work; (c) place of education; (d) at another person's home; (e) community Internet access facility (specific denomination depends on national practices)⁴; (f) commercial Internet access facility (specific denomination depends on national practices)⁵; and (g) others
10. Internet activities undertaken by individuals in the last 12 months
11. Frequency of individual use of the Internet in the last 12 months (from any location)

Table 4. Core indicators on use of ICT by businesses:

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1. Proportion of businesses using computers
 2. Proportion of persons employed routinely using computers
 3. Proportion of businesses using the Internet
 4. Proportion of persons employed routinely using the Internet¹⁹
 5. Proportion of businesses with a Web presence
 6. Proportion of businesses with an intranet
 7. Proportion of businesses receiving orders over the Internet
 8. Proportion of businesses placing orders over the Internet
 9. Proportion of businesses using the Internet by type of access, Narrowband, Fixed broadband, Mobile, broadband
 10. Proportion of businesses with a local area network (LAN)
 11. Proportion of businesses with an extranet
 12. Proportion of businesses using the Internet by type of activity
 - Sending and receiving email
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- Getting information: (a) about goods or services; (b) from government organizations/
 - public authorities via websites or email; and (c) other information searches or research activities
 - Performing Internet banking or accessing other financial services
 - Dealing with government organizations / public authorities
 - Providing customer services
 - Delivering products online
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Table 5. The ICT sector and trade in ICT goods:

1.	Proportion of total business sector workforce involved in the ICT sector
2.	ICT sector share of gross value added (expressed as a percentage of total business sector gross value added).
3.	ICT goods imports as a percentage of total imports
4.	ICT goods exports as a percentage of total exports

At present these are the common and approved set of ICT development measurement indicators. The various subgroups under each heading are taken to be realistic and therefore collecting data from all the countries through various sources is quite possible.

Digital divide:

The term “digital divide” refers to the imbalances in access to physical infrastructure, such as computers and Internet, mobile and other tools of communication. Digital divides can exist between developed and developing countries (also known as global divide), or within a country (known as internal country divide). It can manifest itself in different demographic characteristics of the population, such as age, gender, income and race, or different locations, such as urban and rural.

Regardless of connectivity and infrastructure disparities, Digital divide can be evident in the following issues:

- local content development in terms of the number and quality of local websites, local language content and the use of local online content by key sectors;
- collective knowledge generation;
- building a domestic knowledge economy and promoting online transactional capabilities for the consumer, business, and government sectors;
- the capacity of workforces to play roles in the Internet age – this include improving Internet access and educational offerings in schools and colleges, creating digital libraries for universities, promoting professional training
- institutes, and stimulating the economy to absorb these people;
- overcoming cultural inhibitions and insecurities about developing competence for surviving the breakneck speed of the Internet age and the creation of a risk-taking culture;
- co-operation and collaboration between different sectors and also within the private sector;
- creating open investment climates for the incubation, launch, acceleration and initial-public-offering phases of ICT-related SMEs; and
- ICT as a core feature of innovation and competitiveness.

While public policy and academic literature frequently tout substantial progress in bridging the digital divide, over half of the world's population does not presently have access to even a telephone, let alone the Internet. In parts of the developing world, less than 1 in every 1,000 people has access to a computer compared to nearly 600 in every 1,000 in the developed world. Though globalization is now the most widely used term all over the world but some countries still strive towards making the benefits of global ICT available to all people.

The uneven availability of access to information and communication technologies i.e. digital divide among the world's population has great importance to public policy and the well being of nations and individuals worldwide. Of particular importance, from a global "public welfare" perspective is unrealized potential economic and human development that could be achieved through information communication technologies. On an individual basis, this forgone development activity translates into higher rates of poverty, poorer health, lower literacy and quality of life than is necessary.

Given these disparities, the digital divide is really a reflection of existing disparities between the haves and have-nots. As a meeting of the Organization for Economic Cooperation and Development (OECD) put it,

“The digital divide is a symptom of existing economic and social divides, which will widen even further if developing countries are not helped to take advantage of ICT in tackling economic and social problems and are denied access to markets that are becoming increasingly ICT-dependent as part of globalization.”

ICT lead development:

With its multi-dimensional supremacy and pervasive effect ICT can revolutionize almost all the aspects which can lead a country towards prosperity and development. If applied with proper and structured approach ICT can help to bridge the digital in-equality and show ultimate paths of economic development. There are impressive examples of ICT lead development among the countries which were earlier used to struggle for economic development but later on turned into dominant economic force of the world. Moreover the ICT evolution starts as soon as the ‘E’ gets added with every thing i.e. E-commerce, E-health, E-education, E-policies etc.

Some of the key forces of development that are lead by ICT are discussed below:

Role of E-commerce in accelerating economic development:

Electronic commerce is an emerging concept that describes the process of buying and selling or exchanging of products, services and information’s via computer networks including the internet.

In the emerging global economy, e-commerce and e-business have increasingly be-come a necessary component of business strategy and a strong catalyst for economic development. The integration of information and communications technology (ICT) in business has revolutionized relationships within organizations and those between and among organizations and individuals. Specifically, the use of ICT in business has enhanced productivity, encouraged greater customer participation, and enabled mass customization, besides reducing costs. With developments in the Internet and Web-based technologies, distinctions between traditional markets and the global electronic marketplace-such as business capital size, among others-are gradually being narrowed down. The name of the game is strategic positioning, the ability of a company to determine emerging opportunities and utilize the necessary human capital skills (such as intellectual re-

sources) to make the most of these opportunities through an e-business strategy that is simple, workable and practicable within the context of a global information milieu and new economic environment. With its effect of leveling the playing field, e-commerce coupled with the appropriate strategy and policy approach enables small and medium scale enterprises to compete with large and capital-rich businesses. On another plane, developing countries are given increased access to the global marketplace, where they compete with and complement the more developed economies. Most, if not all, developing countries are already participating in e-commerce, either as sellers or buyers. However, to facilitate e-commerce growth in these countries, the relatively underdeveloped information infrastructure must be improved.

It is recognized that in the Information Age, Internet commerce is a powerful tool in the economic growth of developing countries. While there are indications of e-commerce patronage among large firms in developing countries, there seems to be little and negligible use of the Internet for commerce among small and medium sized firms. E-commerce promises better business for SMEs and sustainable economic development for developing countries. However, this is premised on strong political will and good governance, as well as on a responsible and supportive private sector within an effective policy framework.

The adoption of ICT by companies requires a business environment encouraging open competition, trust and security, interoperability and standardization, and the availability of finance for ICT. This requires the implementation of sustainable measures to improve access to the Internet and telecommunications and increase IT literacy at large, as well as development of local Internet content.

At the same time, e-strategies should be better integrated into the overall policy frameworks and strategies of countries. The inflow of foreign investments and international support through development cooperation measures is equally important.

Formulating national ICT policies and e-strategies:

National ICT policies help guide a country or jurisdiction in its use of these tools and secure the benefits of the information economy for all. ICT policies require to be planned in order to marry the needs of people with the opportunities and possibilities that are available through the use of ICTs. Policy-making must be based on the best information and intelligence available. It should be undertaken in consultation with stakeholders to help secure beneficial and realistic outcomes. ICT policies deal with issues related to information dissemination and use as well as issues related to the spread and use of the technology itself. Policies alone address specific issues. When considering a larger whole, such as the development needs of a community, jurisdiction or country, it is necessary to think in terms of a strategy, in this case an e-strategy.

E-Strategies are plans based on the selection of scenarios and options for applying ICTs to national development. They apply specifically to sectors such as e-commerce, e-government, e-learning (which is sometimes confused with distance learning), e-health (which is sometimes confused with telemedicine), and related e-enabled sectors and activities. Simply put, these e-enabled activities are the application of ICTs to the usual business processes that are specific to each sector and area of human activity. A strategic approach denotes a process involving analysis of priorities and constraints before arriving at a recommendation for the resolution of a given issue. One of the main objectives of ICT policies and strategies is to ensure the greatest possible diffusion of ICTs, commensurate with national needs, ambitions, specificities and concerns. Thus, information and

ICT policies must take into account local, national and international issues, as well as sectoral concerns. An ICT policy for national development requires policies for learning and education, government, private sector and industrial development, local and community development, empowering women and other groups, and promoting research and development especially in applied sciences. Only then will it ensure that content on the Internet is relevant and reflects national specificities while protecting IPR, and so on. The strategy to deliver ICT policies has to consider institutional and operational issues. An action plan details the organization required to implement the strategy. ICT policies and strategies need to be integrated into broad development concerns and mainstreamed into all aspects of society and of development planning.

Introducing E-governance:

Imagine a situation in which all interaction with government can be done through one counter 24 hours a day, 7 days a week, without waiting in lines. This is quite a normal scenario in the Europe or the USA and the other developed countries of the world with the blessings of Digital governance. Digital Governance is often referred as E-governance, Electronic Governance. In simple terms, it refers to governance processes in which Information and Communications Technology (ICT) play an active and significant role.

The role of ICT in Governance Sphere could be 4 fold:

- Improve quality of governance products and services being currently provided
- Provide new governance services and products
- Enhance participation of people in choice & provision of governance products & services
- Bring new sections of society under the governance sphere (including those who are most likeable to remain excluded - namely the poor, the illiterate, the differently abled, indigenous people, the migrants and displaced people)

In other words, it is **WRONG** to equate Digital Governance with simply digitalization, or automation of governance services. It is much more than that. Digital Governance has to be seen as a 'tool' for good governance and human development. Direct effects of e-government include cost effectiveness in government and public operations, significant savings in areas such as public procurement, tax collection and customs operations, with better and continuous contacts with citizens, especially those living in remote or less densely populated areas. Indirect effects are no less important, and include greater transparency and accountability in public decisions, powerful ways to fight corruption, the ability to stimulate the emergence of local e-cultures, and the strengthening of democracy.

These are among the reasons why e-government, after spreading through developed market economies, has now become a priority in an increasing number of developing countries. Around the world, significant resources are being mobilized, as well as additional human resources and energies, to develop, implement and promote the use of e-government. However, since such resources remain scarce in regard to the immense tasks of socioeconomic development and poverty alleviation, it is essential that they be used wisely and with a maximum chance of success. Benefiting from other countries' experiences, understanding their successes and failures, and adapting that knowledge to the characteristics of one's socio-economic environment will be vital to the future of e-government in many parts of the world.

E-governance benchmarking:

Not many of the countries of the world have been blessed with the blessings of E-governance. Significant difference is found to be existent between the developed and the underdeveloped countries of the world. Due to the complex nature and heavy investment required underdeveloped countries are still striving to adopt E-governance and make its facilities available for the citizens. A study conducted by Waseda University Institute of e-Government has identified some indicators, which shows the level of E-governance practice in a country.

1. Network Preparedness

→ Internet users → Broadband users → Digital mobile users → PC users → Security system

2. Required Interface-Functioning Applications

→ Online applications → e-tender system → e-tax system → e-voting system → e-payment system

3. Management Optimization

→ System optimization → Integrated network system → Administrative and budgetary systems

→ Public management reform by ICT

4. Homepage/Portal Situation

→ Updated Frequency → Public disclosure → Link navigation system → Multi-language correspondence

5. Introduction of CIO

→ Introduction of CIO → HRD for CIO → Supporting body for CIO → Role and function of CIO

6. Promotion of e-Government

→ Priority of e-gov planning & strategy → Promotion activities → Legal framework → Evaluation system

E-health : ICTs for Health and the Fight against Disease

Information and Communication Technologies (ICTs) have an ever-growing impact on our working and private lives, and the healthcare sector is one of ICT's newest additions, which is termed as "E-health." Simply put e-Health means Information and Communication Technologies tools and services for health.

e-Health systems provide patients with better information – on treatments, on their condition, and on improved standards of living – and make it simpler for healthcare professionals to access and share information, both general and patient-specific. The use of electronic patient records allows doctors to see much more of a person's medical history than do paper files, which typically only include information on treatment in a single surgery or hospital. A patient's condition can be monitored remotely, either freeing up a hospital bed which would have been required with previous monitoring equipment, or providing a better standard of care for the patient. On-line tools can help patients to understand their conditions better and make it easier for them to find and talk to fellow sufferers, for example through on-line support groups which boost patients' spirits in the face of serious illness.

e-Health applications bring efficiency and productivity advantages to the management and delivery of health and medical services. Some key applications can have an important impact on health delivery. *Telemedicine* has been considered of great use, although it depends on access to broadband as well as modern medical or hospital services that are not always available in developing countries, especially in the rural areas. In China, access to information about health has been demonstrated to be a priority in some of the poorer provinces. This is especially important

since, with the recent de facto privatization of health services in that country, people can no longer get free advice or visit the doctor for free. Access to information about public health issues is a major concern. In many societies, women are especially at risk because they have fewer opportunities to access independent and trustworthy information about maternal and child health. In some countries, health professionals are predominantly men and this may hinder women's access to medical and public health information. Policy-makers need to be aware of these issues and of ways in which the Internet and community health and access centers, along with radio and television, can serve women and men equally. Some countries have developed partnerships between governments and civil society organizations (CSOs) working in health care to establish health portals dedicated to helping citizens become better informed in matters related to their own health. An example is the Canadian Health Network.

Moreover, the rapid increase in the use of wireless devices presents some opportunities to deliver health messages to patients in appropriate languages and dialects. Short message service (SMS) applications have been developed to remind patients to take their medicine. For chronic diseases such as tuberculosis and AIDS, these applications have proven to be very effective. Policy-makers also need to be aware of these specialized applications for the delivery of health services.

Use of ICT in education and learning: E-education

A global revolution is taking place in education and training. It is driven by the changing nature of work, the realities of the information age, new global partnerships and an awareness of the need for equal distribution of educational opportunities.

Education systems have an obligation to deliver on public expectations of quality education for economic growth and social development. Quality improvement and the enhancement of excellence are often perceived to be antithetical to increased access to equity and redress. In the context of developing countries, in particular, efforts to achieve the former are thwarted by, among others, fiscal constraints, spatial barriers and other capacity-related limitations to delivery. As demonstrated in various contexts, information and communication technology (ICT) has the potential and capacity to overcome most of these barriers.

E-education involves e-teaching and e-learning along with the various administrative and strategic measures needed to support teaching and learning in an Internet environment. It will incorporate a local, regional, national and international view of education.

e-Education is more than developing computer literacy and the skills necessary to operate various types of information and communication technology. It is the ability to:

- Apply ICT skills to access, analyze, evaluate, integrate, present and communicate information;
 - Create knowledge and new information by adapting, applying, designing, inventing and authoring information;
 - Enhance teaching and learning through communication and collaboration by using ICT;
- and
- Function in a knowledge society by using appropriate technology and mastering communication and collaboration skills.

e-Education views ICT as a resource for re-organizing schooling and as a tool for whole-school development. It includes ICT as:

➔ a tool for management and administration ➔ a resource for curriculum integration; ➔ a communication tool ➔ a collaborative tool for teachers and learners; and ➔ a learning environment that advances creativity, communication, collaboration and engagement.

ICT, when successfully integrated into teaching and learning, can ensure the meaningful interaction of learners with information. ICT can advance cognitive skills such as comprehension, reasoning, problem-solving and creative thinking. Success in the infusion of ICT into teaching and learning will ensure that all learners will be equipped for full participation in the knowledge society before they leave a further education and training (FET) institution.

Moreover, these learners are likely to utilize e-Government processes, not only to acquire and use information, but also to implement public sector reforms that can enhance transparency in government operations. These learners will use ICT to enhance interaction between citizens, governmental organizations and public and elected officials.

These learners will invent new ways of using ICT to realize the Department of Education's vision of developing a new citizen who is a critical and active lifelong learner.

The challenge facing our education and training system is to create a learning culture that keeps pace with these changes and equips people with the knowledge, skills, ideas and values needed for lifelong learning. Our education system must create graduates who use information effectively and constantly keep abreast of technological advances.

CONCLUSION

The emergence of global market place have raised the stakes for all countries to become technologically connected—to be able to create, adapt and use global technological innovations. Yet the challenges of competing in the technology-based global market place and of harnessing technology as a tool for human development are very different across countries, which vary greatly in their technological capacity and needs. However, to maximize the benefits of ICT it is evident that ICT lead development tools be implemented successfully. To that various policy making and is required at all levels.

Measuring E-readiness is an important part of ICT revolution to bring into effect to any country. Therefore, e-readiness measurement plans should be developed before implementing the ICT policy implementation. The utilization of ICT, the development of new technologies, and their mobilization for economic and social development require sufficient political, economic, technical, and legal capacity to create a supporting environment. Therefore govt. and policy makers should focus on creating such favorable environment for ICT policy implementation. Besides, In order to build sufficient infra-structure for ICT revolution FDI (Foreign Direct Investment) is an important issue which should be encouraged and favorable policy should be made to allure foreign organizations.

The Report is intended at the time when the global economy is facing the greatest depression and crumple on its way all over the world. Still we don't have any idea how long this downfall will continue and how profound its impact will be on economy and human development. But as we

know that ICT is one of the most powerful drivers of growth and development, which if deployed and structured in a correct manner can bring radical changes and remove all sorts of depression and downfall. This paper presents a measurement approach to assess the technological achievements of a country, as an aid to policy-makers in identifying policy priorities.

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