

DIFFUSION OF ICT IN SELECTED ASIAN COUNTRIES

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ABSTRACT

ICT is encased by a new vision of exchanging information across borders and creating the scope of unique form of human relationship. This may create space for more democratic and creative expansion, or indeed, have the reverse effect; depending on the relative economic, social and political power specific internet groups can harness to champion their grievances. Under this backdrop, the present paper examines the Diffusion of ICT in selected Asian countries during the digital era. Diffusion and in Asian countries, reveals that there is lot of effective efforts needed complete utilization of ICT for socio economic development. There is one major thing is to conclude that still there is lack of cooperation among the neighbourhood countries. It will adversely impact on the development of the ICT to encounter problems like poverty, illiteracy, health problems and so on.

Keywords: Information and Communication Technology, Diffusion, Asian Region

I. INTRODUCTION

Information and Communication Technology was emerged in South Asia after 90's. From the last one decade we had experience of new innovation and inventions in the ICT sector (Nagesh, 2000). People from one country to another country people can exchange their view, information and messages each other easily with low fare, due to the effectiveness of ICT in developed as well as developing countries. If we were remember situation of information and communication in early 80's then it is very difficult to compare present with past situation. Because of that time for communicating or exchanging information among the people takes more time as well as money (Srinivasan, 2005). But now, ICT not only attract the people but also satisfy their essential needs like education, employment, health, culture and entertainment aspects and so on. At present, not only urban people are exploiting the ICT but also rural people moving fast

direction they won't live without ICT. In this way ICT becoming significant as well as one of the robust income source to the respective governments of developing countries. Following words of M.S. Swaminathan (who is a pioneer of green revolution in India) hold the relevance of ICT.

“The Mission for achieving a knowledge revolution in India derives strength and confidence from the numerous outstanding initiatives underway in the country under the sponsorship of Central and state governments, civil society organisations, academia and the corporate sector. The beneficial impact of ICT on the rural economy and quality of life is now widely recognised”. (Swaminathan, 2006)

In the case of Asian region, perhaps three stages of systematic technological development could be loosely demarcated. The first refers to advanced levels of industrial and technical skills in the pre-colonial era. This failed to serve as a sufficient basis for launching a successful of the Chinese experience, contrasting sharply with the British or Japanese case. The post-colonial state-centered of import-substituting technological industrialization was built massively in the time of two world wars. A third, dramatic episode of systematic technological change in South Asia takes place in the form of the recent, ongoing ICT revolution (Ashwini and Vijayabaskar, 2005).

ICT is encased by a new vision of exchanging information across borders and creating the scope of unique form of human relationship. This may create space for more democratic and creative expansion, or indeed, have the reverse effect; depending on the relative economic, social and political power specific internet groups can harness to champion their grievances. Analytically, the contribution of ICT to economy could be viewed at two different but interrelated levels: on account of ICT growth and on account of ICT diffusion. The former refers to the contribution in output, employment, export earning as well spreading social awareness etc., on account of the production of ICT related goods and services which are confined to just one segment of the economy or country (Kraemer and Dedrick 2001). But ICT has the potential to enable closer interaction and universal bonds between and within national, individual, groups and institutions to portray specific and previously distant causes which may otherwise be discarded. ICT encompasses the collection, capture, processing, storage, retrieval and transmission of information, embodying text, data, sound (audio), vision (video) and graphics. Harnessing of ICT for the development of developing countries are calls for development of capabilities at different levels. This includes the capability to develop local content by taking in to account the development needs of different sectors and also the ability to make effective use of the same (Joseph and Abraham., 2005). Thus, it may be argued that the presence of a vibrant ICT sector capable of addressing issues like health, education, environment and gender inequality etc., It may be facilitates for the diffusion of Information Technology.

Therefore, ICT became one of the essential needs to the people in the world like food, cloth, shelter. But somewhere else still developing countries are suffering from lack of information and communication, diffusion of ICT and influence of ICT on Socio-economic status of these countries. By keeping these points in mind here we are going to discuss things which every man should involve in that process and execution of the technology. Here few selected Asian countries like India, Pakistan and Sri Lanka. However, this has to be firmly linked to the critical role of ICT in stimulating development and ushering in the Information Age.

II. BACKDROP OF ICT

It is important to recognise the history of ICT in terms of innovation. From the invention of the telegraph in 1844, the telephone in 1876, the light bulb in 1879, the first hydroelectric power station in 1881, radio waves in 1894, flow of electricity in 1904, radio with sound in 1906, birth of television in 1926, magnetophon in 1935, first working computers in 1943, the silicon chip in 1959, the telecommunication satellite in 1962, the first successful Personal computer in 1978, existence of internet with accessible to users via modern link in 1989, special connection to the internet accessible 1999, smart space technology 2002, Video phone technology in 2004 and in future anticipated Blue tooth with small electronic device in 2008 to enable access information from anywhere in 2008 and all above shows the entry of ICT to the world with broad sense. But in narrow sense, the first machine was invented in 1904 which was a Canadian design from the Ferranti-Packard company, originally called the FP6000. The story is that this machine with 'core store memory' fired up with its program still in store after its sea freight journey from Canada. One feature of these mainframes was the common instruction set throughout the range; it means that programs written and compiled on one machine would run unchanged on any other. In fact the hardware makes the difference between machines. To achieve this program termed as "the executive" or *exec* encapsulated the hardware and supplied software routines to supplement the hardware supplied instructions. By 1968 ICT had merged with English Electric computers and become International Communication Ltd (ICL). There are two types of information handling device. The first is analogue. The second is digital, based on counting numerical digits. But ICT revolution tends to replace with analogue with digital. Today we can see so many digital systems in the world.

III. OBJECTIVES

The Objectives of this study are very important for this research work. It is better to know what are the objectives. They are given below.

- To assess the diffusion of ICT in selected Asian countries.
- To examine the emergence of India as a leader in South Asia in the field of ICT.

IV. METHODOLOGY AND TYPE OF DATA USED

The Methodology for this topic depends on the different programmes and projects are taken in selected countries where it promote welfare of the people through diffusion of ICT. The Secondary data used for this study which is collected from various National and International institutions. Like World Bank, UNESCO, International Telecommunication Union (ITU) and Government Departments of selected countries and various UNDP Reports. The method of research has been done in the form of socio and economic perspective with referring to selected countries. Here notion of South Asia especially referring to only India, Pakistan and Sri Lanka.

V. DIFFUSION OF ICT SELECTED ASIAN COUNTRIES

To elaborate the picture of ICT, there is necessary condition to know the diffusion of ICT. There are few indicators considered for the diffusion of ICT especially for India, Sri Lanka and Pakistan. Main Indicators are Proportion of Expenditure on ICT, Telephone subscriber, cellular subscribers and finally Internet as well as number of Personal Computers (PCs) or Information Technology. There are some important literature signifies the role of ICT in promoting socio-economic development in terms of empirical rigour and diversity of opinions, despite having a short history (Hitt and Bryniolfsson 1996). The final report of the Digital Opportunities Task Force (DOT Force 2001) has highlighted the transformational impact of ICT by examining over three hundred ICTs for development initiatives situated around the world. After 90s existence of globalization in the world created competition among countries. This competition tends to encourage information and communication technology in these countries. Especially in India, Pakistan, Sri Lanka are moving towards self-sufficiency in ICT, but countries like Bhutan, Nepal, Bangladesh and Maldives are initiated programme for the development of ICT. Expenditure on ICT in selected countries like India, Pakistan and Sri Lanka as well as china was also shown in following table.1.

Table 1: Increase in ICT expenditure of Three Asian Countries in Year 1995 2001 and 2009

Country	ICT expenditure as % of GDP		
	1995	2001	2009
India	2.9	5.7	4.48
Pakistan	NA	NA	4.36
Sri Lanka	NA	NA	4.34
China	2.1	3.9	5.95

Note: Figures in parenthesis denote percentage changes as compare to 1995

Source: Development Data Group, World Bank.

In the above table clearly reveals that country like India has increased dramatically in Expenditure on ICT. Total ICT expenditure in India increased from 7250 million US dollars in 1995 to 66612 million US dollars in 2001. At the same time, in percentage to the total GDP is increased from 2.9 per cent to 5.7 per cent in respective years.

Number of Internet users in Pakistan are 2 per cent of the number of users in India. Number of secured servers in Pakistan is about 5 per cent of that installed in India. Number of servers in China and Korea are much higher than that in Pakistan. Here Pakistan has to do lot efforts if its business to compete in international trade in the New Economy (Kalin and Suleman). Similarly, to the expenditure on ICT with referring to respective country showed in narrow term. If we look in to broad term then there is need to consider above mentioned indicators which will provide sufficient information about diffusion of ICT in respective countries. Let us take each indicator one by one.

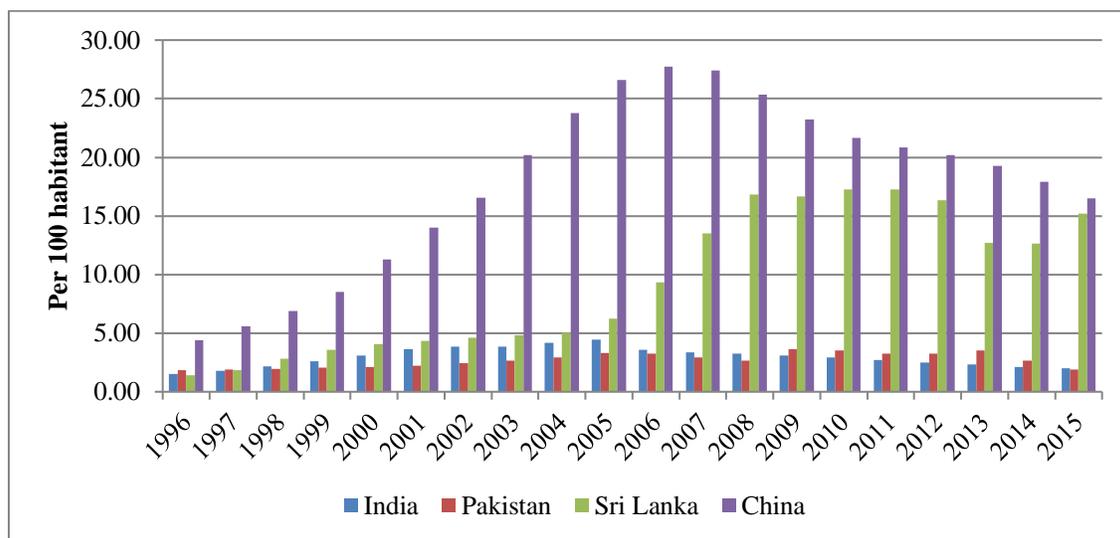
Table 2: Country and Year wise Fixed Telephone Subscribers (per 100 people)

Year	India	Pakistan	Sri Lanka	China
1996	1.49	1.83	1.39	4.40
1997	1.80	1.91	1.85	5.59
1998	2.14	1.94	2.82	6.91
1999	2.59	2.04	3.58	8.54
2000	3.11	2.12	4.07	11.31
2001	3.64	2.21	4.35	14.00
2002	3.85	2.44	4.58	16.54
2003	3.84	2.66	4.81	20.17
2004	4.16	2.90	5.02	23.79
2005	4.45	3.31	6.24	26.59
2006	3.57	3.26	9.36	27.73
2007	3.39	2.93	13.51	27.40
2008	3.23	2.64	16.85	25.35
2009	3.11	3.61	16.68	23.22
2010	2.91	3.51	17.24	21.65
2011	2.69	3.25	17.24	20.84
2012	2.50	3.27	16.35	20.20
2013	2.32	3.50	12.72	19.27
2014	2.13	2.65	12.64	17.90
2015	1.99	1.88	15.21	16.48

Source: statistics on the basic indicators of ICT, ITU

First Indicator of diffusion of ICT is Telephone subscribers and it is in terms of thousand. All indicators are having seven years of data on all three countries for respective columns. **Table.2** reveals that India Telephone subscribers increased from the 1.49 per 100 person in 1996 to 3.11 per 100 persons in 2008 after it has declined to 1.99 in 2015. As compare to India, Pakistan and Sri Lank have better proportion of telephone subscribers if consider in terms of population. Pakistan and Sri Lanka are followed same pace of growth in this Indicator. We can see typical picture of three countries in terms of telephone subscribers per 100 inhabitants. One interesting factor is that Sri Lanka and china are maintained first place fixed telephone subscribers (**Figure.1**). Second place attained by India but in 2008 it come down in to third place. India and Pakistan are also increased telephone subscribers per 100 inhabitants increased till 2008.

Figure 1: Telephone Subscribers per 100 inhabitants in Selected SA Countries



Source: statistics on the basic indicators of ICT, ITU

From the above figure we can find three phase of growth of telephone subscribers of these countries. First phase is from 1996 to 2006, second phase is 2007 to 2011 and third phase is 2011 onwards. However, here we can see varying trend in all three countries.

At present, there is hot competition between cellular mobile and main telephone line. Because of new technology and innovation tends to produce efficiently as well as maintain cellular phones comfortably. At the same time there is also increase in main telephone subscriber lines. As compare to main telephone, cellular phones are capturing market heavily. Compound Annual Growth Rate (CAGR) of cellular with respect to India is declined from 115.7 per cent to 90.6 per cent in 2005. Except Pakistan (60.9% to 110.8%) Sri Lanka found same experience in case of

India. As percentage to the total telephone subscribers in India (6.6 % to 64.4 %), Pakistan (8.5% to 70.8 %) and Sri Lanka (27.6 %to 73 %) are improved. Apart from the cellular mobiles, Main Telephone Subscribers Line (MATSL) in terms of numbers as well as MATSL per 100 inhabitants shows the increasing trend in three countries and Sri Lank has achieved 6 per cent which is highest as compare to other two countries (India-4.51% and Pakistan-3.43%).

Table 3: Country and Year wise Cellular mobile subscribers and Main Telephone Subscriber Lines

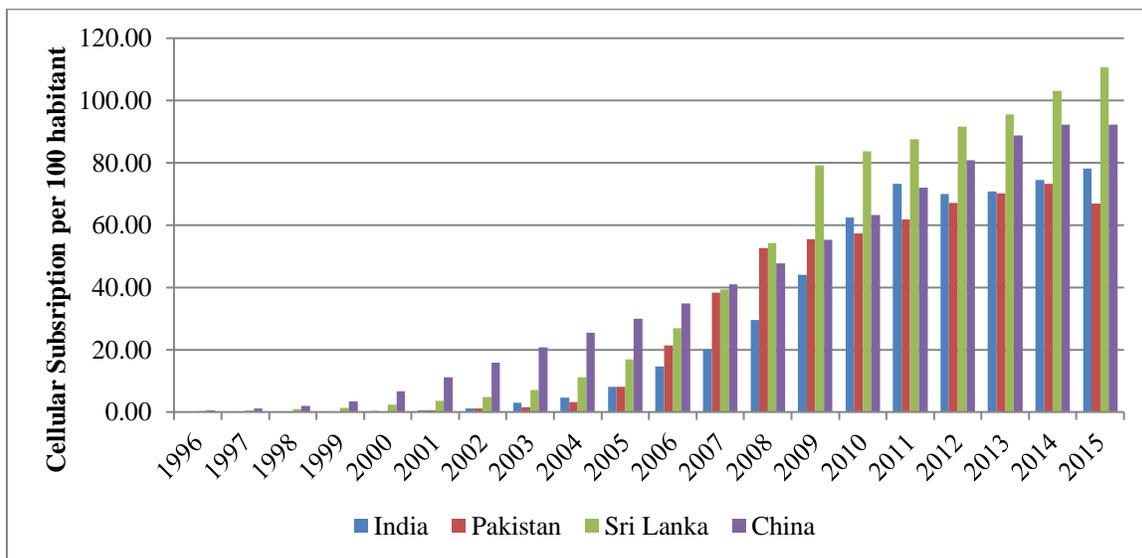
Year	CAGR of cellular mobile (%)	% digital	As % of total Telephone subscribers	MATSL (000s)	MATSL per 100 inhabitants
India					
1999	NA	100	6.6	265113	2.66
2000	115.7	100	9.9	32436.1	3.20
2001	81.3	100	14.3	38536.2	3.75
2002	70.5	100	23.4	41420.0	3.98
2003	85.4	100	38.4	42000.0	3.97
2004	90.5	100	51.8	43960.0	4.07
2005	90.6	100	64.4	49750.0	4.51
Pakistan					
1999	60.9	30.1	8.5	2874.0	2.12
2000	49.6	50.2	9.1	3053.5	2.20
2001	61.3	71.4	18.6	3252.0	2.28
2002	65.9	40.7	31.7	3655.5	2.49
2003	65.1	28.7	37.3	4047.4	2.70
2004	80.0	13.8	52.7	4502.2	2.95
2005	110.8	NA	70.8	5277.5	3.43
Sri Lanka					
1999	54.5	18.0	27.6	671.9	3.69
2000	53.0	44.0	35.9	767.4	4.16
2001	56.5	75.1	44.7	827.2	4.42
2002	52.0	81.1	51.3	883.1	4.66
2003	51.6	78.6	59.7	939.0	4.88

2004	53.9	49.5	69.0	993.4	5.10
2005	50.9	32.6	73.0	1244.0	6.00

Source: statistics on the basic indicators of ICT, ITU

There is dramatic change in the Cellular mobile subscriber per 100 inhabitants (**Figure.2**) as compare to MATSL per 100 inhabitants. In this figure we can find that there are two phases in cellular mobile subscriber per 100 inhabitants. First phase starts from 1996 to 2002, second phase start from 2003 to 2005. In the second phase we see robust growth of three countries. Here Sri Lanka achieved highest percent where it has increased from 1.41 to 16.21 per cent from 1999 to 2005 and Third phase of change occurred in 2006 to 2015. Wherein, India and Pakistan lag far behind to Sri Lanka in terms growth. However, there is competition between India and Sri Lanka for capturing second place.

Figure 2: Cellular mobile subscribers per 100 habitants in Selected SA Countries

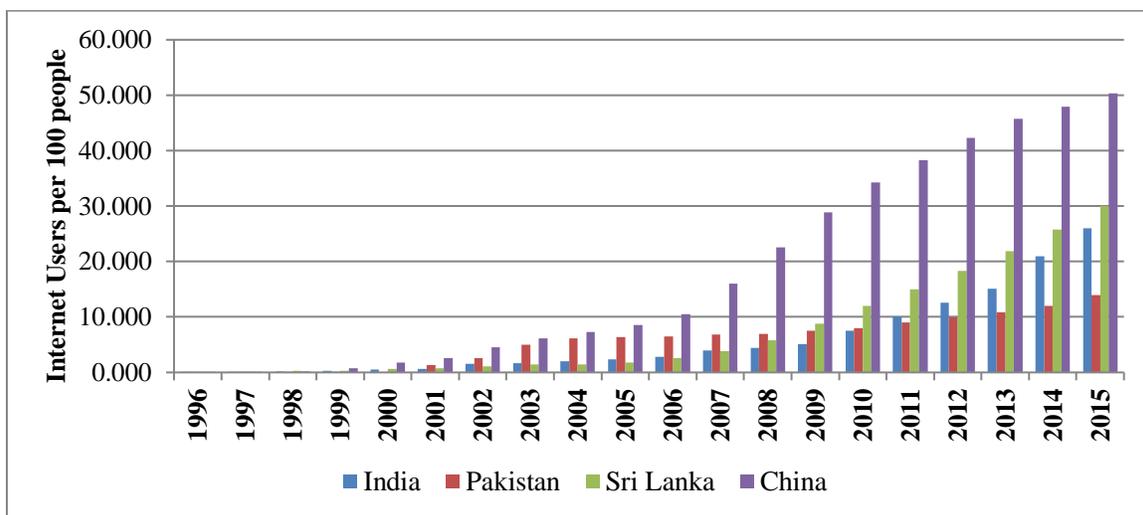


Source: statistics on the basic indicators of ICT, ITU

Diffusion of Information Technology is third and last indicator of diffusion of ICT in the developing countries. Diffusion of Information Technology is combines with Internet hosts, users as well as PCs. In terms of internet hosts there is similar kind of trend in hosts per ten thousand in inhabitants. Wherein, total number of hosts makes some difference between them. Total internet hosts in India and Pakistan increased dramatically and Sri Lanka followed by these countries.

In India number of internet users has been increased rapidly from 20 million in 1996 to 50 corer in 2015. There is dramatic increase in the internet users in Pakistan as compare to India and Sri Lanka. If we consider internet users per 100 inhabitants then three countries have different kind of results as compare to total internet users. From 1996 to 2015 three countries a below 2 per cent, hence there is dramatic increase in India and Pakistan after 2003 to 2005. Where china stood first then India second, followed by Sri Lanka and Pakistan (**Figure.3**).

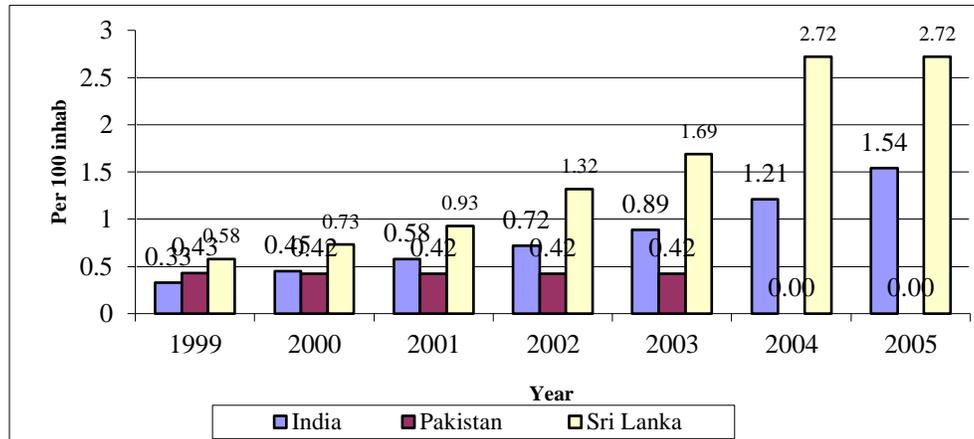
Figure 3: Internet Users Per 100 inhabitants in Selected SA countries



Source: statistics on the basic indicators of ICT, ITU

Number of Personal Computers (PCs) is also one of the indicator of Information Technology diffusion. The proportion to PCs in three countries increased rigorously in numbers. In PCs used per 100 inhabitants gives different result as compare to Total numbers PCs in three countries. Here Sri Lanka by achieving 2.72 per cent got first rank as compare to India and Pakistan (**Figure.4**).

Figure 4: Number of PCs used per 100 inhabitants in Selected SA countries



Source: statistics on the basic indicators of ICT, ITU

Unavailability of data from last two years leads to consequence in interpreting status of Pakistan in number of PCs used per 100 inhabitants. However one thing is to be clear that diffusion of ICT exhibits the clear picture of ICT in India, Sri Lanka and Pakistan.

VI. Potential Emergence of India in ICT sector

India is emerging as potentially in ICT as compare to other Asian countries like Pakistan, Sri Lanka and Bangladesh etc. This potentiality is providing leadership to India in the Asian region especially in ICT sector. For supporting to this statement there are few indicator are there. Namely Employment, Output, Export, Revenue etc. If we take in terms of employment opportunities to work in the IT sector has been increased from 4500 in 1999-00 to 2800000 in 2014-15. At the same time, revenue of the IT services also raised in robust manner. Revenue from IT service has been increased from 59 billion dollars in 2008-09 to 143 billion dollars in 2015-16. Here we see that within three to four year there was 60 billion dollars of revenue gained from the IT sector.

Table 4: ICT exports as percentage of service exports of Balance of Payment in Selected Asian Countries

Year	India	Sri Lanka	Pakistan	China
2010	65.90	26.53	72.27	29.31
2011	63.34	25.00	57.32	56.28
2012	67.71	20.73	72.41	53.29
2013	69.77	17.96	66.19	53.39
2014	68.39	15.70	68.25	58.30
2015	69.90	14.67	71.97	58.20

Source: International Monetary Fund, Balance of Payments Statistics Yearbook

This much of revenue collection cannot imagine non other than IT service or ICT sector. An estimates made by the Nation Association of Software and Service Companies (NASSCOM) suggest that the share of IT exports increased from the 66 per cent in 2010 to 70 per cent in 2015 as percentage of total export of service (**Table 4**). If we consider in terms of dollar India's IT exports has increased from 75 billion dollar in 2010 to 100 billion dollar in 2015. Obviously, there is eight fold increased in the IT exports. Last but not the least, there is impressive increase in the ratio of IT sector output to the total GDP. It was 0.38 per cent in 1991-92 but it has increased to 9.3 per cent in 2015-16. From these tips we can make out that India has all qualities to become Leader in ICT in South Asia region as well in the world.

VII. CHALLENGES TO BE CONFRONTED TO ICT IN SELECTED COUNTRIES

As we seen different kinds of programmes and projects to implementing ICT to solve the socio-economic problems. At the same time how ICT has diffused among these countries. However, there are well defined challenges faced by these countries. These are discussed in detail.

- The benefits of applying ICTs in health care are constrained by limited human and institutional capacities. Common to most poor developing countries. There is a large gap in basic infrastructure availability. The ability and willingness of health workers and other to make use of the opportunities, the availability of relevant and localized digital content, government regulations and policies and ICT sustainability.
- There is lack of computer skills which has prevented many health care professionals from harassing the potential of ICTs. Inertia and the fear of new technologies have also prevented many from utilizing of ICTs.
- These countries main challenge is that information economy function mainly in English. While a majority of the total global online population comes from non-English speaking

areas. 68.3 per cent web pages are written in English. Here, each countries government should take action either invest on development of local language or invest on developing English skills among the people.

- The digital revolution has created a dilemma for less educated on the one hand, it creates new and better jobs but, on the other end it raises the bar on high demand skills which they do not possess.
- In the part of education, main challenge of ICT is lack of effective promotion to create awareness, limited transmission, lack of videotapes which will helpful in increase efficiency to reach every one. Lack of telecast in other language apart from English and National language of respective country.
- Another challenge is as compare to developed countries, developing countries has limited resource, inequality, inefficiency. Therefore, CT lagging behind in developed countries.
- In terms of gender equality in Asian region. Total number of women or girls internet users constitute less than one per cent of the population. And most of women internet users belong to the predominantly urban, educated elite rather than rural and poor family women.
- Women from rural area facing so many challenges as compare to urban women to embrace the benefits of utilizing ICTs. Because of socio-cultural notion of male superiority and hierarchy, low level of literacy and lack of computer education.
- Women in many developing countries have put themselves to different responsibilities like take care of children, husband and other family members. Especially rural women have lack of time to learn vocational and formal education. But where she can only have little time to spend on ICTs.
- With respect to environment sustainability. ICT is used mainly for environment monitoring and less alteration is given to risk and vulnerability analysis.
- The Role of NGOs and private organization in ICT promotion for environmental sustainability remain weak. Because most of ICT tools are governed by state controlled organizations.
- Last but not the least. Lack of Public awareness, remains weak in the environment sustainability area. The shortage of budget results in ICT measures being focused only on major environment problems.

VIII. POLICY IMPLICATIONS

Every challenge or consequence has its own kind of resolution. Similarly, in the part of ICT in developing countries also can found many challenges. To overcome these consequences and to enhance success then there is need policy inference as resolution. Any country in the world

especially developing countries should realize that execution of policy implications effectively is one of the major secrets of success. However, some policy implications needful with reference to Asian countries. They are mentioned in following points.

- ✓ Technological intervention should be supplemented by strong content provision and must be combined with well planned development programme.
- ✓ To provide good infrastructure facility for rural where people can exploit the ICT sector more than there is possibilities for to overcome socio-economic obstacles.
- ✓ Access to ICTs enhances traditional or formal education system and these countries should concentrate on those technologies that compensate for the factors that are not available.
- ✓ There is need to focus on technological alternatives that at low cost, bring the imagination and creativity of a few excellent teachers to student. Another point is to stress on how to fund, implement and maintain the educational part of ICT networks for reaching majority of poor, uneducated rural populace.
- ✓ There should be an allocation of financial resources on the national budget to support strategies to increase women's participation in the information economy, including funding for NGOs to strengthen opportunities for women's empowerment through ICTs.
- ✓ There is need for sufficient policy and law which can help these countries to cope with the process by adapting ICT. In this way it will allow them to utilize the benefits of ICT and minimizing its adverse consequence.

IX. CONCLUSION

Information and communication Technology has to be remembered for long period of time. Because ICT emerged as quickly as compare to other technology and it is reaching at peak level around the world. Every day there is a different kind of innovations taking place in the ICT sector. Diffusion and impact of ICT in Asian countries, reveals that there is lot of effective efforts needed complete utilization of ICT for socio economic development. There is one major thing is to conclude that still there is lack of cooperation among the neighbourhood countries. It will adversely impact on the development of the ICT to encounter problems like poverty, illiteracy, health problems and so on. Another major issue can be taken from the study is role of R&D, is essential factor for ICT. Even we can see a big gap between R&D and ICT. It means quality and quantity of R&D projects and programmes are depleted manner. Standardized and Deterministic programmes are only can enhance the usefulness of ICT. There is more political will and cooperative method like Public and Private Partnerships (PPP) are needed to compete with the developed countries. However, people from developing countries are habituated with

traditional values and ethics. It will create fear to accept any technology or innovation. Unless and until any technology understandable to lay man then only ICT or any technology will knock the door of people mind. International Institutions like UNESCO putting huge efforts to implement ICT for the resolution of socio-economic problems. If it is successfully done, then ICT will more applicable as well as appreciable to the developing countries.

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