Comparative Study of Electronic Government Infrastructure of Nepal with SAARC Nations

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***Abstract*— Electronic Government Infrastructure (EGI) is an essential part of e-Government Implementation System, which is used to disseminate various services to the citizens. Infrastructure is a necessary physical part of e-Government system. EGI is used for providing a mechanism to coordinate work activities in the public sector. E-infrastructure directly reflects to change the way Government function in terms of the organization of the government, its relationship with its citizens, institutions and businesses & cooperation with other organizations. Basically this paper looks existing infrastructure of e-Government system of Nepal, which play major role for the development and implementation of e-Government in Nepal, and also displays the result of infrastructure in the comparison of SAARC Nation's e-Government infrastructure. This paper has also focused on existing infrastructure for the development and implementation of e-Government system. The research paper shows the comparative study of electronic government infrastructures of Nepal with SAARC Nations.**

Keywords—e-Infrastructure, e-Government, e-Government Master Plan, Comparison Factors, Index

I. INTRODUCTION TO EXISTING ICT INFRASTRUCTURE OF NEPAL

In Nepal, the first computer was introduced in 1971. In 1974, an Electronic Data Processing Center was established as a National Computer Center. In 1982, Data System International (DSI) was established as a first international software development. From 1985 onward personal computer were introduced in market for citizens. Some private organization and personal started to use the computers for data processing and other day-to-day activities. According to the Country Report on Internet in Nepal, Mercantile started first commercial E-mail service in June 1994, Internet Service in 1995 in Nepal. In 1996 Nepal Government established separate ministry named as Ministry of Science and Technology for the development & implementation of ICT activities within the country. Then immediately Government licensed three ISPs in 1997, and published Telecommunication act in same year. Government established Nepal Telecom Authority in 1998 and Information Technology Policy in 2000. For the development, implementation and awareness of ICTs National Information Technology Centre (NITC) was established in 2001, and High Level Commission for Information Technology (HLCIT) was established in 2002 for the development of effective rule and regulation and, centre to implemented ICT in the country. Electronic Transaction act, IT Policy and Telecommunication Policy 2004, Electronic & Digital Signature Act 2006 were published for the development and distribution of ICT within the country. For the development and implementation of electronic transaction system and delivered the services to the citizens and businesses, e-Government Master Plan (eGMP) was prepared by Government supported by Korea IT Industry Promotion Agency (KIPA). In 2008 High Level Commission for Information Technology (HLCIT) Nepal Government and Korea IT Industry Promotion Agency (KIPA) signed the MOU on consulting for the establishment of the e-Government master plan for development and implementation of e-Government system. Then Government Integrated Data center (GIDC) building was built for the development and implementation of e-Government system. But it has not implemented till now due to some reasons. Among some reason, ICT infrastructure factors for the implementation of e-Government system. [1]

II. E-GOVERNMENT MASTER PLAN (EGMP) 2006.8

To keep peace with this global trend, Nepal, a developing country, would broadly utilizes, the Information Communication Technology (ICT) to solidify economic development, strengthen democratic norms and values, improve the quality of life, and thus reduce poverty. eGMP 2006.8 has created a vision and a mission for the development and implementation of e-Government System to delivered the required services in citizens and businesses. eGMP 2006.8 also stated 'in five years, all the government agencies in Nepal would be interconnected via network and Nepal will provide citizen-centric and transparent services for its people. Through this, it will establish the knowledge-based society. Ultimately Nepal will maximize the use of ICT to create values for individuals, organizations, industries and all other parts of society, and create synergy effect through networking. In this respect, the vision statement for the Nepali e-Government is

defined as following. The e-government vision is the 'The Value Networking Nepal, through:

- Citizen-centered Service
- Transparent Service
- Networked Government
- Knowledge-based Society

The top level goals set by the Electronic Government Master Plan (eGMP) consulting report for are as follows:

G2C: Provide Customer-tailored services

G2B: Provide Transparent and prompt services

G2G: Networked and Knowledge based government

Infrastructure: Favorable ICT infrastructure and legal framework.

This stated vision set to achieve the following outputs: Improving Citizens convenience, Transparent Service, Knowledge-based Government and improving nationwide ICT resource. [1]

eGMP 2006.8 stated the mission to achieved the vision and goals of e-government in Nepal. The e-Government mission statement is "improve the quality of people's life without any discrimination, transcending regional and racial differences, and realize socio-economic development building a transparent government and providing value added quality services through ICT. So, the future image of Nepali e-Government, when the vision and mission for e-Government are achieved, is a government that provides administrative services to its people through various channels, improving the convenience of the people. Through this, the Nepali government would be able to realize a knowledge-based society. By the year 2015, Nepal will have transformed itself into a knowledge-based society by becoming fully capable of harnessing information and communication technologies and through this means, achieving the goals of good governance, poverty reduction & social and economic development. So, achieving the vision, goals and mission, need to established very strong ICT infrastructures. [1]

III. E-GOVERNMENT REQUIREMENTS

e-Government is a kind of process of reform in the way government work, services, share information, engage citizens and provide services to external and internal customers for taking the benefit of both government & customers that they have given or serve. There are several application which have used to serve various services by the help of efficient and advanced ICT infrastructures. Good e-government requirements can driven by economic, political, technical and cultural reasons. E-government requires modern technology ICT infrastructure include application to secured and protect the privacy of end users and delivered the require services. The following Figure 01 display the types of e-Government application for the delivering the services. [2]

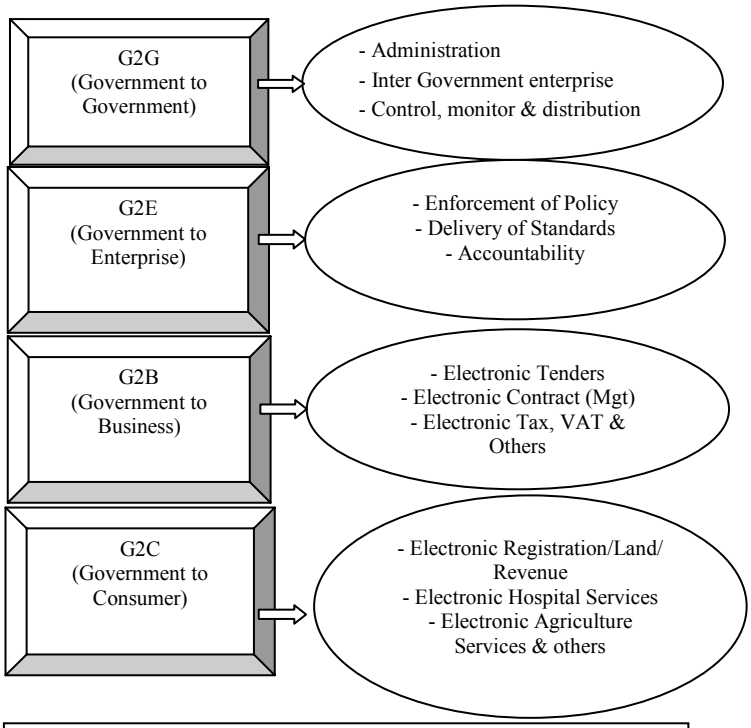

Figure 01: Type of e-Government Applications

IV. ARCHITECTURE FOR AND E-GOVERNMENT APPLICATION

The following Figure 02 presents the typical architecture which has been used to deliver the services to the stakeholders.

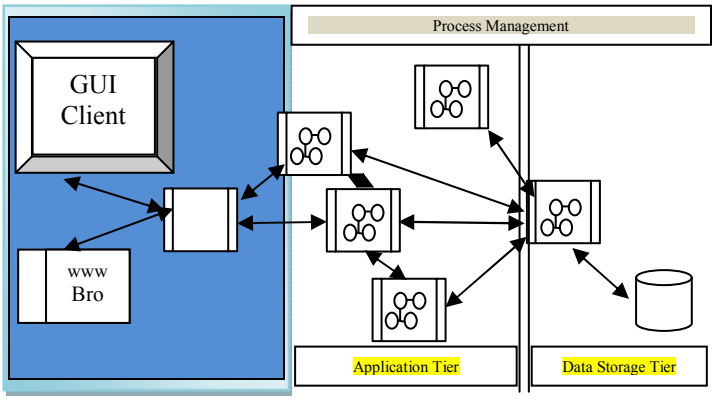

Figure 2. Typical architecture for an e-Government application

V. CHALLENGES WITH EXISTING INFRASTRUCTURE

Government is facing problems in ICT and electricity power backup within the country. There is no ICT infrastructure in government to implement e-Government. Before establishment of e-Government in the country should maintained standardization of ICT infrastructure. eGMP 2006.8 mentioned only the way of access point through high speed internet and network. Master plan consulting team recommends informatisation of administration service first.

Expansion of access to rural and mountainous areas needs to be better to be after that. Without informatization of administration service, connectivity itself has no meaning. In order for a country to establish an e-Government and to pursue national development by promoting ICT industry, it is inevitable that the country should standardize various codes generated from automation of administrative businesses and ICT devices. Such ICT related national standardization necessary for establishing e-Government is as following. Standardization includes the ICT code system, equipment, interface, protocol, network, language, application, security, and etc (code system, Hardware/Software). The following are the major challenges with existing infrastructure in the context of Nepal.

1. Application Life Cycle Management
2. Software Licensing and Support
3. Scalability
4. Accountability
5. Modifiability
6. Physical Security

Except some private organization overall ICT infrastructure of Nepal has very poor. All Government organization using old ICT not updated till now. It is impossible to implement e-Government in the country without strong and applicable infrastructures.

VI. INFRASTRUCTURE STATUS OF NEPAL FOR E-GOVERNMENT IMPLEMENTATION

The ICTs infrastructure is very important parts for the development and implementation of e-Government System. Lack of technological infrastructure is a major bottleneck for countries aiming to implement and maintain e-Government. The ICT (Computer, Telephone, Internet, Power backup) is the powerful mechanism for the implementation of e-Government system in the country. The technical survey report shows the Existing situation of ICTs of the implementing organizations. The following table displayed the actual conditions of ICT infrastructures of Nepal.

TABLE I. RESULT OF EXISTING ICTS INFRASTRUCTURE

Existing System of ICTs	% of Grading (out of 37 respondents)
Poor	66.67%
Good	30.56%
Very Good	00.00%
Excellent	02.77%

[Data Source: Problem and Prospect of e-government Implementation in Nepal, Ph.D. Research Technical Survey Report-2011]

The Table 1, there is a big ICTS infrastructure gaps and constraints for the development of e-Government.

VII. COMPARATIVE RESULT OF ELECTRONIC GOVERNMENT INFRASTRUCTURE OF NEPAL WITH SAARC COUNTRIES

Nepal's ICT infrastructures is very weak to develop and implementation of e-Government System in the comparison of SAARC region's countries ICTs infrastructures. According to United Nation e-Government Survey Report visualized the actual status, world rank and SAARC rank of ICT infrastructures of Nepal in the comparison of SAARC countries.

Communication Infrastructure in Nepal:

TABLE II. VOICE TELEPHONE SERVICE

Service	Penetration Rate %	Subscribers
Fixed	3.15	841020
Mobile	56.55	15056109
Others	4.06	1082147

[Data Source: Nepal Telecommunication Authority, Management Information System, Published on July, 2012] [3]

Figure 3. Voice Telephone Penetration Rate in %

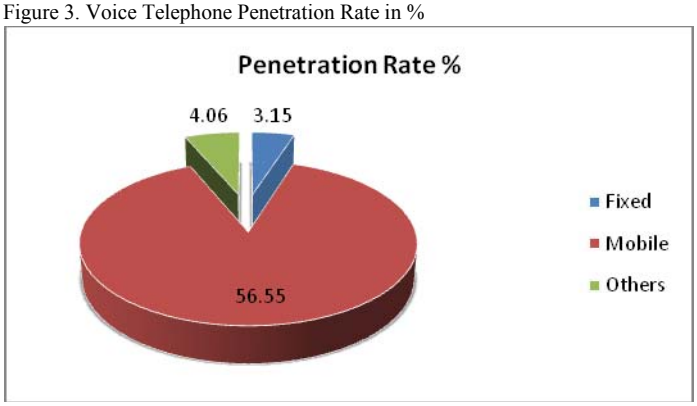

TABLE III. DATA/INTERNET SERVICE

Service	Subscribers in %	Subscribers
Dialup (PSTN+ISDN)	0.31	15087
Wireless Modem, Optical Fiber Ethernet	0.68	33798
Cable Modem, Cable Etc.	0.36	17958
ADSL	1.76	86980
GPRS	93.15	4605719
CDMA 1X	3.74	184937
Total		4944479
Internet Penetration Rate %		18.75

[Data Source: Nepal Telecommunication Authority, Management Information System, Published on July, 2012] [3]

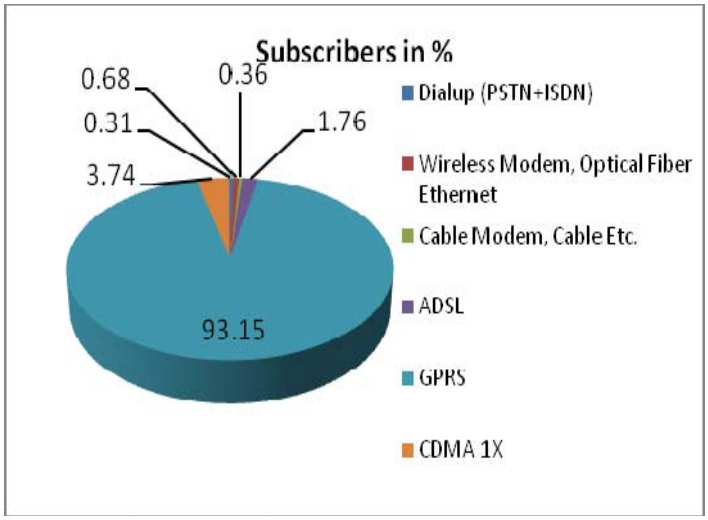

Figure 4. Data/Internet Subscribers in %

TABLE IV. LICENSE ISSUED BY NTA TILL 14 JULY, 2012

Name of Services	Number of the Licensee
Basic Telecommunication	3
GSM Cellular Mobile	2
Network Service Provider	7
VSAT User	77
Internet (with E-mail)	42
GMPCS	3
Rural Telecom	2
Limited Mobility	108
International Trunk Telephone	4
Rural VSAT User	16
Rural Internet Service Provider	6
Total	270

[Data Source: Nepal Telecommunication Authority, Management Information System, Published on July, 2012] [3]

TABLE V. GLIMPSE OF SUBSCRIBER'S SERVICES

Name of Services	% of total subscribers of Internet	Number of Internet Subscribers
Dialup (PSTN+ISDN)	80.1	5130
Wireless Modem, Optical Fiber Ethernet	7.1	455
Cable Modem, Cable etc.	12.8	818
Total	100	6403

[Data Source: Nepal Telecommunication Authority, Management Information System, Published on July, 2012] [3]

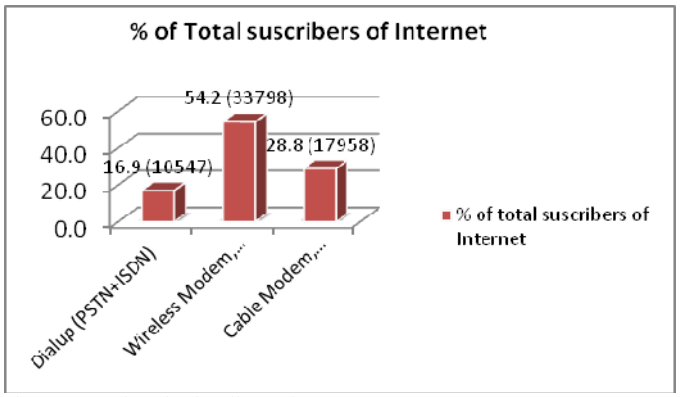

Figure 5. % of total subscribers of Internet

According to mentioned data, for the development and implementation of e-Government system in the country, the telecommunication infrastructure is poor. Communication devices play major role for the dissemination public services through the e-Government system by Government. Telecommunication is the important part for the development and implementation of e-Government services in the country. In the comparison of South Asia Association of Regional Countries (SAARC), mentioning infrastructures is Very low.

TABLE VI. E-GOVERNMENT DEVELOPMENT RANK (WORLD/RANK)- 2012

Country	SAARC e-Government Rank	World e-Government Rank
Maldives	1	95
Sri Lanka	2	115
India	3	125
Bangladesh	4	150
Bhutan	5	152
Pakistan	6	156
Nepal	7	164
Afghanistan	8	184

[Data Source: United Nation E-Government Survey – 2012, Survey Methodology] [4]

TABLE VII. E-GOVERNMENT DEVELOPMENT INDEX-2012

Country	E-Government Index Value
Maldives	0.4994
Sri Lanka	0.4357
India	0.3829
Bangladesh	0.2991
Bhutan	0.2942
Pakistan	0.2823
Nepal	0.2664
Afghanistan	0.1701

[Data Source: Data Source: United Nation E-Government Survey – 2012, Survey Methodology] [4]

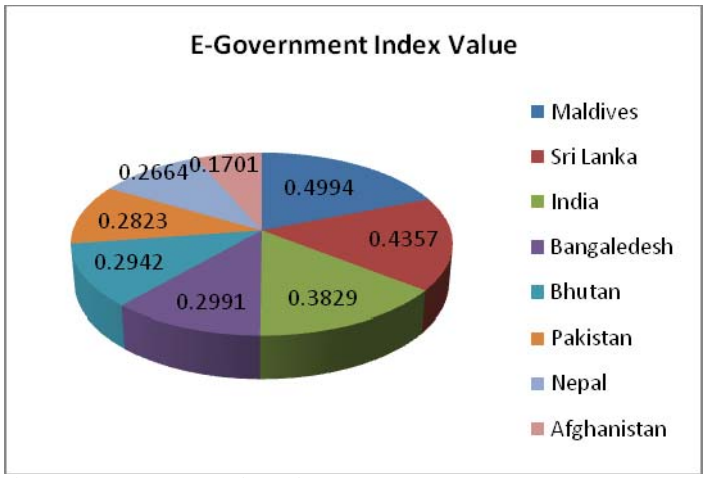

Figure 6. E-Government Index Value

Table VIII. Online Service

SAARC Rank	Country	Online Index Value
1	India	0.5359
2	Bangladesh	0.4444
3	Sri Lanka	0.3791
4	Pakistan	0.3660
5	Bhutan	0.3529
6	Maldives	0.3268
7	Nepal	0.2876
8	Afghanistan	0.2353

[Data Source: Data Source: United Nation E-Government Survey – 2012, Survey Methodology] [4]

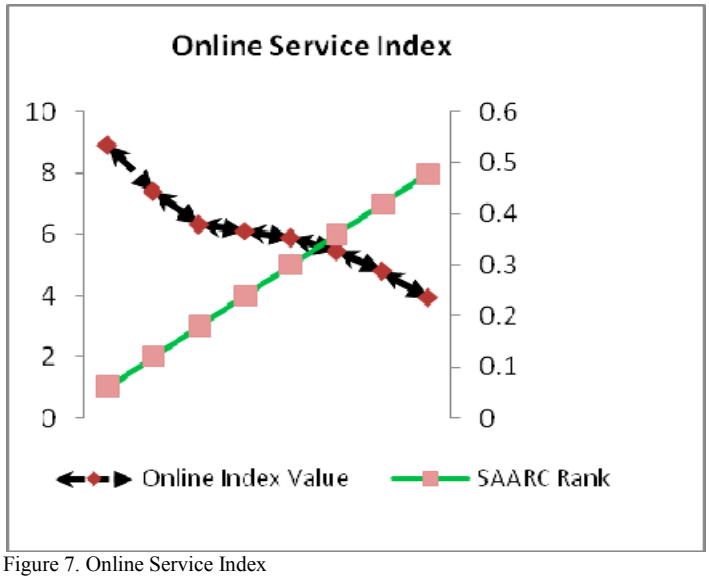

Figure 7. Online Service Index

TABLE IX. TELECOMMUNICATION INFRASTRUCTURE

SSARC Rank	Country	Telecommunication Index Value
1	Maldives	0.3599
2	Sri Lanka	0.1922
3	Pakistan	0.1239
4	Bhutan	0.1143
5	India	0.1102
6	Bangladesh	0.0641
7	Nepal	0.0597
8	Afghanistan	0.0573

[Data Source: United Nation E-Government Survey 2012, Survey Methodology] [4]

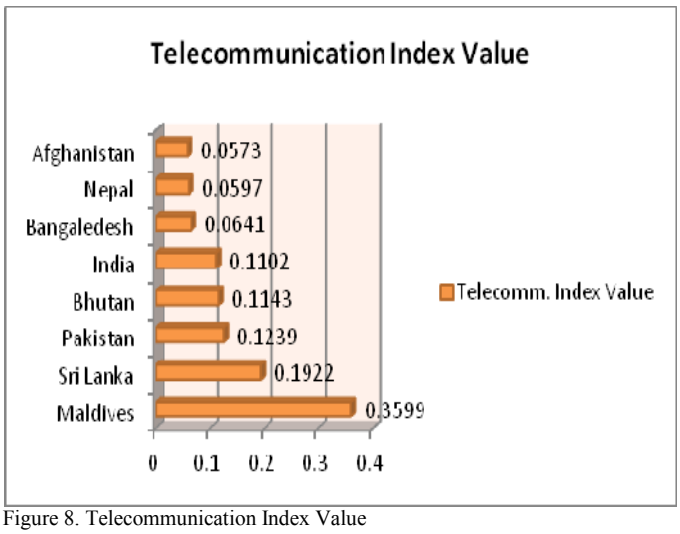

Figure 8. Telecommunication Index Value

TABLE X. ICT INFRASTRUCTURE – 2010

Country Name	Infrastructure Index	SAARC Rank
Maldives	0.2885	1
Sri Lanka	0.1081	2
Pakistan	0.0770	3
Bhutan	0.0619	4
India	0.0583	5
Bangladesh	0.0330	6
Afghanistan	0.0327	7
Nepal	0.0226	8

[Data Source: United Nation E-Government Survey 2010 Survey Methodology] [5]

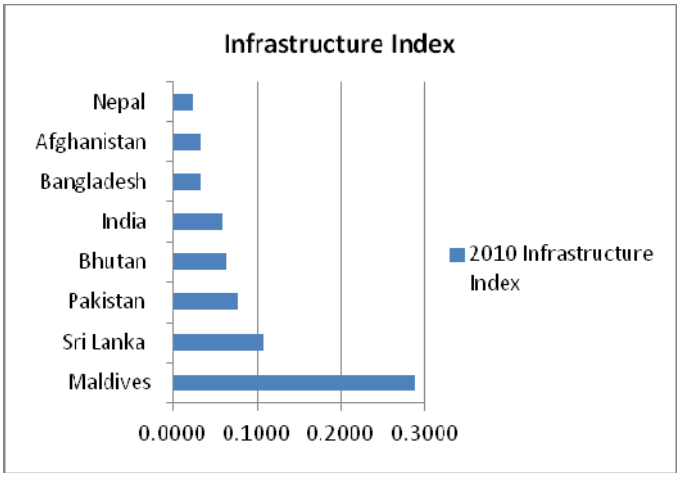

Figure 9. Infrastructure Index 2010

TABLE XI. PERSONAL COMPUTER PER 100 INHABITANTS – 2010

Country Name	Personal Computer Distributions per 100 inhabitants	SAARC Rank
Maldives	14.8600	1
Sri Lanka	3.5400	2
Pakistan	0.5200	6
Bhutan	1.6000	4
India	1.5400	5
Bangladesh	2.4200	3
Afghanistan	0.3200	8
Nepal	0.4900	7

[Data Source: United Nation E-Government Survey 2010 Survey Methodology] [5]

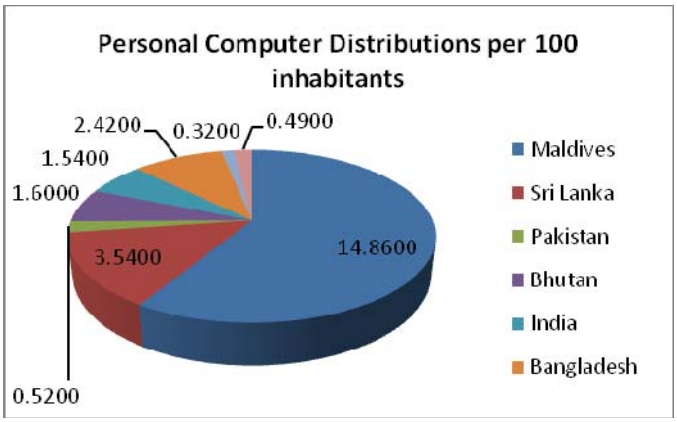

Figure 10. Personal Computer Distribution per 100 inhabitants.

TABLE XII. INTERNET USERS & SUBSCRIPTIONS PER 100 INHABITANTS

Country	Internet users per 100 inhabitants	Internet Subscriptions per 100 inhabitants
Maldives	28.30	6.44
Sri Lanka	12.00	1.21
India	7.50	1.53
Nepal	6.78	0.28
Bangladesh	3.70	0.11
Pakistan	16.78	2.17
Bhutan	13.60	0.93
Afghanistan	4.00	0.01

[Data Source: United Nation E-Government Survey 2012 Survey Methodology] [4]

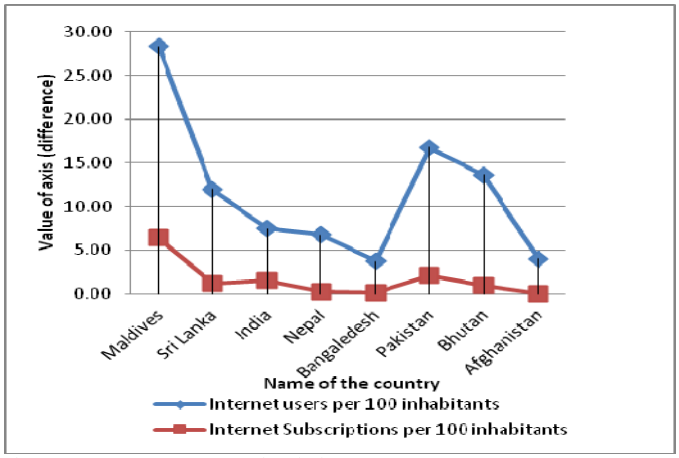

Figure 11. Internet users & Subscriptions

According to given Figure 09 that the ICT infrastructures are very poor in the comparision of other 7th SAARC regional

countries. ICT infrastructure of Nepal is very low for the implementationa and development of e-Government system. In the comparision of SAARC regiona's countries, the telecommunication infrastructure and their existing components index are very limited for the use of e-Government implementation. So, In the context of Nepal ICT infrastructure is very challenges issues for the development of e-Governmet system to exchange the services to the citizens level.

VIII. CONCLUSION

Comparative study of e-Government infrastructure of Nepal with South Asian Association Regional Countries (SAARC), it is too limited infrastructure for the development and implementation of e-Government system. Insufficient ICT infrastructure, Telecommunication infrastructures are the major challenges for the implementation of e-Government. All government organizations are using very poor ICT devices and other related equipments. They have not developed sufficient and strong ICT infrastructures till now. According to eGMP's goals, Vision and objectives of e-government it has not possible to implement the system with existing ICT systems. To achieve the goal, vision and objectives of e-Government should necessary to develop the infrastructures within the government organizations. So, in this research paper mainly focuse on ICT infrastructures development for the implementation of e-Government System.

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