Technological Forecasting & Social Change 96 (2015) 92–100

Contents lists available at ScienceDirect

Technological Forecasting & Social Change

Club convergence and factors of digital divide across countries ☆

Seung Rok Park [a,1], Doo Yull Choi [b,*], Pilky Hong [c,2]

[a] Hansung University, South Korea
[b] Korea University of Technology & Education, South Korea
[c] Seoul Digital University, South Korea

ARTICLE INFO

Article history:
Received 23 October 2014
Received in revised form 1 February 2015
Accepted 16 February 2015
Available online 20 March 2015

Keywords:
Digital divide
ICT
Digitalization
Log t club convergence test
Creative economy

ABSTRACT

By examining the digital divide phenomenon among 108 countries, this paper attempts to develop a greater understanding of the factors that can foster a more creative global economy. As part of this investigation, a new ICT development index is constructed using principal component analysis and the inclusion of conventional ICT development indicators. Using Phillips and Sul's (2007) log t convergence test, we found that the level of digitalization convergence that exists among the 108 countries analyzed can be categorized into three different groupings. Within these groups, we found that the 1st group which contains the highest level of convergence showed the slowest speed of convergence, while the results for the 3rd group displayed the lowest convergence level with the highest speed of convergence among its members in digitalization. This study also identified the factors that drive a country's digitalization convergence level, these included: per capita GDP, tertiary education entrance rate, the ratio of urban population, and the share of service trade in GDP. With the exception of urban population, which showed results to the contrary, all of these factors were proven to raise a country's likelihood to belong to a higher convergence level. As for policy measures that can be used to foster a creative economy, marginal effect analysis identifies the tertiary education entrance rate as being the most effective means for raising the digitalization convergence level.

1. Introduction

It has been observed that various digital devices and services are diffusing fast around the world with different speed. As is well known, the development of Information and Communications Technologies (ICT) drives and enables access to information and knowledge, and to date ICT has played a very critical role in helping to develop national economies and in ensuring that the businesses that operate in these countries remain competitive as well.

However, there exist serious inequalities in access to and use of ICT among the categories of persons in a given population and also across countries.

When one considers the rapid changes that have occurred in the fields of digital technology and services, many individuals have problems in taking advantage of the various digital devices and service opportunities. Geographical distribution of ICT infrastructure can also create unequal conditions for using and having access to ICT. The residents in remote sparsely populated areas are less likely to have enough ICT infrastructure and services when compared to those residents living in high density areas. We call this disparity in ICT diffusion and the unequal access to or uneven use of ICT among people in the same segment of society, a digital divide.

The digital divide in general is characterized as the inequality in use and ownership of the digital devices or services such as

☆ This research was supported by NRF (Korea Research Foundation), 2013S1A3A2042735, The Construction of Linkage Model and Strategies of Job Creation through New Creation Economy Industry and High Concept, CT, ICT, Creative Class, Creative Economy and Job Creation.

* Corresponding author. Tel.: +82 1053627538.
E-mail addresses: parksr@hansung.ac.kr (S.R. Park), dychoi@koreatech.ac.kr (D.Y. Choi), pilky@sdu.ac.kr (P. Hong).
[1] Tel.: +82 1054760961.
[2] Tel.: +82 1062717420.

http://dx.doi.org/10.1016/j.techfore.2015.02.011
0040-1625/

computers, internet and mobile phones. The level of digital divide can be measured in terms of ICT investments, PC skills, internet skills, and the availability of information and communication networks.

The digital divide that occurs in a society is highly likely to create and aggravate economic and social inequalities. Because of the high levels of productivity that are generated from ICT use, the digital divide is regarded as one of the most important barriers to social inclusion and also as one of the most important barriers to fostering a strong and creative economy.

A creative economy consists of a set of knowledge based economic activities. These knowledge-based economic activities can only materialize when the society as a whole has sufficient levels of digital capability. For a society to become a knowledge-based one, each and every individual must be able to creatively use the digital resources available to them including devices, information, and service opportunities. A society with a serious digital divide can hardly stay competitive, and hence cannot sustain the economic development in the long run. In order to transform the economy into a knowledge based one, the policy makers must find a way to close the digital gap that exists not only between different income groups but also within the income group as well.

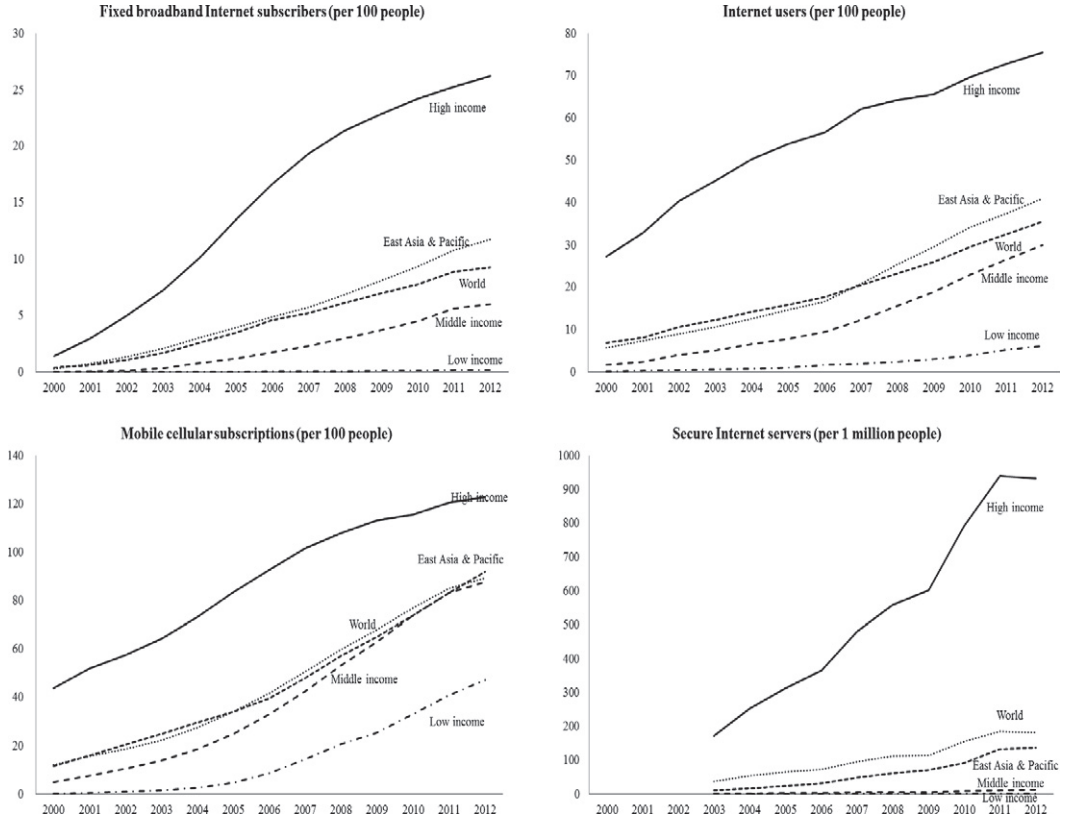
Creative economy involves the integration of existing industries with ICT in order to form a new industrial platform that creates new values and jobs, which can creatively destruct past industrial categories. That is why integrating ICT with various industries is evaluated as a core factor for boosting the creative economy.

The integration of ICT with existing industries not only can increase the productivity of existing industries as has been shown in smart ship building, intelligent traffic control, but also can create new services, such as uber taxi, and smart health care.

This line of reasoning implies that the government must pay attention to the digital divide to transform the economy in a manner that allows it to become more competitive and sustainable. From the viewpoint of the Korean government a 'Creative Economy', for example, can be achieved and sustained by the people equipped with high levels of digital competency. A digital divide in a knowledge-intensive economy may aggravate the issues associated with income divide, which may in turn lead to the creation of a vicious circle of digital and income related divides.

The serious differences in ICT diffusion exist not only among individuals, but also among countries. The digital divide at the cross country level shows similar patterns of GDP divide across many countries. As we can see in Fig. 1, the digital divide that exists across many countries reflects a range of factors including fixed broadband internet subscriptions, internet users, mobile cellular phone subscriptions, and secure internet servers.

Currently this digital divide is being observed not only as a result of economic inequality but also as a driving force of inequality among countries. In fact, some authors even regard



Source: World Bank (http://data.worldbank.org/indicator)

Fig. 1. Digital divide among high, middle and low income level countries.
Source: World Bank (http://data.worldbank.org/indicator).