Assessing Robustness of Asian Countries Ranking: The Case of Digital Divide Index

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ABSTRACT
The term ‘digital divide’ refers to the gap between individuals, households, businesses and geographic areas with regard to both their opportunities to access Information and Communication Technologies (ICT) and to their use of Internet. Composite indicators are regularly used for measuring the divide and in benchmarking the country’s performance. But often it creates controversies regarding the subjectivity that is connected with their construction methodology more specifically the weighting and aggregation issues. The paper attempts to assess the robustness of the ranks generated by the composite digital divide index using different weighting and aggregation schemes in case of Asian countries. Here four weighting techniques Iyengar-Sudarshan Method, Benefit of Doubt Method, Principal Component Analysis and Unobserved Component Model and three techniques of aggregation viz. Linear Aggregation, Geometric Aggregation and Weighted Displaced Ideal Method are used for mutual comparison.

KEYWORDS
Composite Index, Digital Divide, Information and Communication Technology (ICT), Sensitivity Analysis

1. INTRODUCTION
The Digital Divide is described as the gap separating those who have computers and Internet access from those who do not. The Digital Divide is a form of technological inequality separating the “haves” from the “have nots”. The Organization for Economic Cooperation and Development OECD (2001) describes the digital divide as differences between individuals, households, companies and regions related to the access and usage of Information and Communication Technologies (ICTs). Thus, digital divide refers to the uneven distribution of Information and Communication Technology (ICT) between and within nations. In each country, there are people who have access to modern communication technology while others are not enabled to make use of telephone connections, the
internet and other tools of Information and communication technology. Different pace of Information and Communication Technologies (ICTs) implementation generates significant inequalities in level of usage and application of these technologies in different countries, which has generated the so called ‘Digital divide’. There is no doubt that such a digital divide exists but its severity and depth is evaluated differently according to the indicators used to measure it.

During the past decade, Asian region has experienced continuous Information and Communication Technology (ICT) infrastructure developments. Asian countries have experienced a rise in the use of ICTs in the recent years, though the degree of expansion has varied among the countries (Khuong Vu, 2006). Information and Communication Technology (ICT) penetration in major cities in most of the countries has been fulfilled; however, in rural areas it is far below satisfactory level and many people in those regions still do not have access to such technologies. One of the study conducted by (Khuong Vu, 2006) revealed that the “digital divide” challenge is magnified in Asia. In particular, there is a clear divergence trend on the diffusion of personal computers (and therefore, the internet) among the Asian developing countries. Estimates from Internet World Statistics Report, 2011 showed that Asian countries contribute 56% of world population, but in terms of internet penetration Asian countries contribute only 26.2%, which is the lowest.

Following the lowest internet penetration rates, digital divide became a serious problem in Asian countries. Since the region is extremely diverse in terms of income, population size, and geographical features, ranging from land-locked regions in the area of Himalayas and Central Asia to isolated islands in the Pacific. The factors responsible for widening the digital gap may be different for each country, but the effect of such gap on the socioeconomic patterns of the countries remains the same.

The Digital Divide since its conception has got due attention and importance in the International level due to its adverse affect on socioeconomic reforms of a country/region. Various international bodies used composite indicators to measure the digital divide and accordingly ranked the countries basing upon the index score. But it has been observed that countries ranking gets changed using different combination of weighting and aggregation schemes. In this backdrop it is essential to study the robustness of the ranks generated by composite digital divide index using various combinations of weighting and aggregation techniques.

2. LITERATURE REVIEW

The term ‘digital divide’ refers to a situation in which people do not have the same degree of access to modern digital information and communication technologies (ICT) and, for this reason, do not have the same opportunities for social and economic development. According to Dewan and Riggins, the digital divide refers to “the separation between those who have access to digital information and communication technologies and those who do not”. Also, it is evident from the literature that there are many ways to conceptualise the digital divide, nevertheless, whichever concept of the digital divide is used—it will inevitably face some methodological problems in case of quantification of the term. One of the first attempts at rationalizing the procedures of measurement of the digital divide was proposed by Ricci, who illustrated and interpreted the development paths of European countries by constructing an ‘adoption scale’ for digital technologies that results from the aggregation of elementary indicators. Another interesting work is the one by Selhofer and Mayringer, who developed a methodology for benchmarking the development of the information society in European countries. Moreover, there are a number of empirical studies which survey the scale of existing digital divides between countries and between societal sections within a country. In one study, Norris surveys 179 countries across the world to observe the degree of access and use of the internet, and produces
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