Chapter 4

Examining the Evolution of E–Government Development of Nations Through Machine Learning Techniques

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ABSTRACT

Several initiatives have tried to measure the efforts nations have made towards developing e-government. The UN E-Government Development Index (EGDI) is the only global report that ranks and classifies the UN Member States into four categories based on a weighted average of normalized scores on online service, telecom infrastructure, and human capital. The authors argue that the EGDI fails in showing the efforts of nations over time and in informing nations and policymakers as to what and from whom to draw policy lessons. Using the UN EGDI data from 2008 to 2020, they profile the UN Member States and show the relevance of machine learning techniques in addressing these issues. They examine the resulting cluster profiles in terms of theoretical perspectives in the literature and derive policy insights from the different groupings of nations and their evolution over time. Finally, they discuss the policy implications of the proposed methodology and the insights obtained.

INTRODUCTION

The relevance of digitization and electronic service has become evident more than ever before because of the COVID-19 pandemic. The pandemic caused nations of the world to lockdown citizens, close economies, encourage and enforce social distancing measures, and discourage physical contact. To as-

sure existence and continuity of service, and fulfill the needs of customers, governments and enterprises aggressively worked on digitizing business processes and authority structures. Governments at all levels from city administration to regions through provinces to national governments sought to introduce information technology solutions and digitize processes, authority structures, and organizations so that employees could work from home/remote, and customers continue doing business from remote. Some mention COVID-19 as the single most powerful force that dictated governments and enterprises to digitize businesses and services and come up with digital strategies unlike any other force prior to that.

Electronic government (e-government for short) is the application of Information Technology (IT) to government services and procedures in order to deliver public services and information to citizens, businesses and governments electronically (Kim, Pan, & Pan, 2007). E-government redefines the interaction between administrations and customers (such as citizens, businesses and other administrations), and creates an electronic, minimal, more transparent, agile and accountable state (Ciborra, 2005). E-government has several potential benefits such as it increases accessibility of government services, allows greater public access to information, and makes governments more accountable to citizens (Hafkin, 2009; Verkijika & De Wet, 2018). It has also the potential to improve the quality and efficiency of processes, and reduce administrative burden on citizens, businesses and other administrations (Heeks, 2002).

Nations of the world have invested on IT infrastructure and human resource development, restructured and digitized work processes and structures, put in place necessary regulatory frameworks, and set priorities. Several studies have pointed out factors that determine the success and maturity of e-government (Das, Singh, & Joseph, 2017; Lee, Tan, & Trimi, 2005), while others tried to measure and benchmark e-government development efforts of nations using several benchmarking and ranking indices and models (Máchová & Lnenicka, 2015). Some of these models particularly focus on benchmarking online services or websites (Rorissa & Demissie, 2010; Verkijika & De Wet, 2018; West, 2004a), follow a more generalized approach with a focus on processes and services (Kunstelj & Vintar, 2004), and the United Nations e-government index, for example, uses a more broader model that includes tools to measure infrastructure, education and online services (UNDESA, 2020).

These evaluations and researches focus on the construction of e-government indices with a primary focus on ranking nations. While these evaluations and indices are vital to discover and communicate the current state and rank of each nation's e-government status (Kunstelj & Vintar, 2004), and serves as a good benchmark for nations to track their ranked positions from time to time, a mere increase or decrease of a nation's rank by few positions does not provide a bigger picture on their evolution towards making a major transformation over time (Das et al., 2017). A nation's attempt to bring major transformations need to be informed by its past and current profiles and the movement from one comparison set to another. In other words, if there is a major disparity in e-government status among groups of nations, it is important for a nation to set its goal based on this disparity and strive to advance to a high-achieving comparison set.

Secondly, each ranking model or approach has its own drawback. For example, studies show that the current UNDESA e-government ranking system may not clearly indicate the ranks of nations (Whitmore, 2012). The indices developed from the raw data seem to be artificial according to this study. The UNDESA index also places equal explanatory power to the three sub-indices such as IT infrastructure, human capital, and online service and takes the average of the three to derive e-government index for nations. Even if this assumption doesn't bring major change in the ranking, it has a negative impact when grouping countries together. UNDESA, for example, groups countries together as low, middle, high, and very high EGDI if the EGDI of a nation was 0 to 0.25, 0.25 to 0.5, 0.5 to 0.75 and from 0.75 to 1 respectively. We argue that this grouping may not bring countries with similar characteristics together,

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