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System dynamics approach for the economic impacts of ICTs: evidence from Macedonia

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Abstract

Measuring the impact of Information and Communication Technologies (ICTs) on the economy is a major challenge and a research question standing at the forefront of economics in the past years. In terms of methodologies, two approaches have been followed extensively, i.e. the standard growth accounting methodology and the regression-based models. This paper aims at developing an alternative approach to studying the usage and impact of ICTs. For this purpose, a two-step methodology is proposed here. At first, hierarchical cluster analysis is used to provide an objective clustering of countries (Macedonia and EU-28) according to 53 indicator values/scores of the Networked Readiness Index. Furthermore, a system dynamics model is proposed to simulate the evolution of the NRI indicator values for Macedonia. This second step allows for examining the potential of the country to improve its rankings on a global scale and thus, become better at leveraging ICTs for increased competitiveness and well-being. Beyond the rankings, the proposed methodology can serve as a useful guide for those attributes Macedonia should focus on in order to improve its position relative to other countries, i.e. to move from its current to the next higher cluster.

Keywords

hierarchical cluster analysis, ICTs, Macedonia, networked readiness index, socioeconomic development, system dynamics

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Individual usage of ICTs remains a relative strength of Macedonia, especially in terms of the use of social networks.

Introduction

Technology has incredible power to stimulate economic growth, improve people's lives and create opportunities for individuals, firms, and nations worldwide. People are living in an age of unparalleled digital disruption, with huge amounts of technology-driven change, massive innovation, and significant development in the ways people use technology. Today's high-speed broadband networks are paving the way for innovative services, such as eHealth, data-driven manufacturing, and smart cities. The digital economy, which refers to economy empowered by digital technologies, is evolving rapidly around the globe. In fact, such technologies accounted for more than 21% of gross domestic product (GDP) growth in the most advanced economies of the world in the past 5 years, while the European Union (EU) digital economy is growing at seven times the rate of the rest of the economy (European Commission, 2014: 3). The ICT sector produces a quarter of total business expenditure and represents almost 5% of the EU economy, but it contributes far more to overall productivity

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