THE IMPACT OF INFORMATION AND COMMUNICATIONS TECHNOLOGIES DEVELOPMENT ON GDP PER CAPITA

UTICAJ RAZVITOSTI INFORMACISKO – KOMUNIKACISKIH TEHNOLOGIJA NA BDP PO GLAVI STANOVNIKA

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Abstract: *The purpose of this article is to research the impact of ICT development on GDP per capita. ICT has significant impact on the economy, both directly as well as indirectly. The results show that ICT development is a very influential factor of GDP per capita. This is a very clear message to governments, that they should increase investments in ICT, if they want to increase GDP per capita and improve the economic situation of their country.*

Key words: *Country, Development Index, Economy, GDP, Information and Communications Technology*

Sadržaj: *Svrha ovog članka je istražiti utjecaj razvoja IKT na BDP po glavi stanovnika. IKT ima značajan izravan i neizravan utecaj na ekonomiju. Rezultati pokazuju da je stupanj razvoja IKT vrlo utjecajan faktor BDP-a po glavi stanovnika. Ovo je vrlo jasna poruka vladama, da bi trebalo povećati ulaganja u IKT, ako žele da povećaju BDP po glavi stanovnika i poboljšati ekonomsku situaciju u svojoj zemlji.*

Ključne reči: *Zemlja, Index razvoja, Ekonomija, BDP, Informacijske i komunikacijske tehnologije*

1. INTRODUCTION

Authors in this study deal with impact of Information and Communications Technology (ICT) on GDP per capita. Previous studies on the correlation between ICT development index and GDP and also some other economic factors are offering good basis for hypothesis development. However they mostly focus on individual countries, while our study examines the impact of ICT development index on the GDP per capita in 162 countries with the highest GDP per capita. The results therefore provide a general picture of how the level of ICT development index impacts the GDP per capita, and also the answer whether the countries can expect rise of GDP per capita when they increase investments in ICT. As a basis for the level of development of ICT the authors used ICT Development Index, which is a composite index combining 11 indicators (see Figure 1) into one benchmark measure that serves to monitor and compare developments in ICT across countries [1, p. 35]. For other determinant authors took GDP per capita at nominal values, which is the value of all final goods and services produced within a nation in a given year, converted at market exchange rates to current US dollars, divided by the average (or mid-year) population for the same year [2].

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The purpose of this study is to determine whether individual country by increasing inputs in ICT (which in turn means a rise in ICT Development Index) can expect the rise in GDP per capita (or GDP rise in general), which is of course the aim of each country. The aim of the research is to determine whether the ICT Development Index has statistically significant impact on GDP per capita.

2. THEORY BACKGROUND AND HYPOTHESES DEVELOPMENT

ICT has many positive effects on the economy. As Kvochko mentioned ICT is also an important innovation and development factor, and has a significant economic impact in at least five areas [3]:

- Direct job creation,
- Contribution to GDP growth,
- Emergence of new services and industries,
- Workforce transformation,
- Business innovation.

Thomas says, that there is a close link between investment in ICT and productivity growth, which it says will be critical to economic growth in tough financial times. For example, as a percentage of GDP, Europe's stock of ICT capital has fallen to about two-thirds of the level in the US, the world leader, having been close to parity in 1991. The study said that this ICT investment gap has affected Europe's productivity growth, which has averaged only half the U.S. rate since 2000 [4].

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The evidence of correlation between ICT and economic growth has been shown in the case of Kenya [5]. and later in 2011 also presented by Heeks [6]. The report clearly claims, that ICT has been the main driver of Kenya's economic growth over the last decade**.** The report says that Kenya's economy grew at an average of 3.7 percent since 2000. Without ICT, growth would have been a lackluster 2,8 percent which is similar to the population growth rate and more, the income per capita would have stagnated. Therefore it is clear, that ICTs were responsible for 0,9 of the 3,7% annual GDP growth (which is roughly one-quarter of Kenya's GDP growth during the first decade of the 21st century), and for all of Kenya's GDP per capita growth [5, p. 6].

Atkinson and Stewart also mention some other facts about ICT impact on the economy [7, p. 3 – 4):

- in 2011 the IT industry contributed 4,3 % of U.S. GDP,

- global output from IT industries more than doubled from $1.2 trillion in 1995 to $2.8 trillion in 2010,
- IT was responsible for 75% of U.S productivity growth between 1995-2002, and 44% between 2000-2006,
- because of the impact of dot.com Internet domains, annual global GDP of U.S is $1,5 trillion larger,
- between 2006 and 2010, corporations that invested more in IT increased productivity three times faster as corporations that invested less,
- a 10 % increase in broadband penetration adds between 0,25% and 1,38 % points to a country" GDP growth etc.

Atkinson and Stewart also mention other facts about ICT, which have indirect impact on the increase of GDP, such as creating high paying jobs, building high-growth companies, creating new sectors and ways of doing business, drives innovation and it is key source of competitive advantage.

Welfens and Perret [8] results show, that when assuming 10% represents the relevant share of the time budget the digital value-added of private householders stands for an unrecorded digital value-added of 2-5% of GDP, with share of 20% of the household's internet time budget devoted to value-added the in the U.S would be in the range of 4,7%-10,4%.

Vu [9] confirmed that ICT has a significant impact on economic growth. His study showed that the accumulation in ICT capital stock is a significant determinant of the variation in output growth across economies and that ICT is superior to non-ICT in enhancing the efficiency of output growth.

Based on preliminary research authors formulate the following hypothesis:
Hypothesis H1: ICT development index has positive impact on GDP per capita.

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2. METHODOLOGY

Authors used ICT Development index as independent variable [10] and GDP per capita based on current prices as dependent variable [11]. For some countries (for example Burundi, Sierra Leone, Libya, Iraq, San Marino, Swaziland and some other minor countries) data about ICT Development Index was not available, so authors excluded them from the study. Therefore the final number of researched countries is 162.

In the study the authors used simple linear regression for testing the impact of ICT development index on GDP per capita.

4. RESULTS

As it is shown in Table 1 the number of researched countries are 162. The minimum value of ICT Development Index is 1,17 (Chad) and the maximum value is 8,93 (Korea). The mean value of ICT Development Index of 162 included countries is 4,99 with Standard Deviation of 2,21.

The minimum value of GDP per capita is 0,35 (Malawi) and the maximum value is 103,19 (Luxemburg). The mean value of GDP per capita of 162 included countries is 13,58 with Standard Deviation of 18,13.

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
ICT	162	1,17	8,93	4,9922	2,20608
GDP	162	,35	103,19	13,5832	18,13445
Valid N (listwise)	162				

Table 1: The descriptive statistics of ICT Development Index impact on GDP per capita

Source: Research results

In Table 2 the results of testing the impact of ICT Development Index on GDP per capita are presented. As it is shown the ICT Development Index has a statistically significant impact on GDP per capita (B = 6,193, p-value ≈ 0.000, α = 0.05). Authors therefore accepted the hypothesis H1.

Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-17,335	2,331		-7,437	,000
	ICT	6,193	,427	,753	14,494	,000

a. Dependent Variable: GDP

Table 2: The impact of ICT Development Index on GDP per capita

Source: Research results

As it is shown in Table 3, The Value of R Square is 0,568, which means that ICT Development index explains approximately 57% of the Model.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,753[a]	,568	,565	11,96116

a. Predictors: (Constant), ICT

Table 3: Model Summary

Source: Research results

4. CONCLUSIONS

The results of author's research show that ICT Development Index has statistically significant impact on GDP per capita. As it shows the value of R Square (0,568) selected variable explains 56,8% of the model, which is very good for only one variable. This fact only confirms that the ICT development in an individual country is very influential factor on GDP per capita in that country and consequently of course very significant economic factor of economic development of that country. Therefore country leaders should increase investments in ICT and consequently increase the economic development of the country.

ICT Development Index is a very significant influencer of GDP per capita, but it should be considered that there are other factors that have a significant impact on economic development and of course also on the GDP per capita of each country. Therefore authors suggest that future researches should test also the impact of some other variables that could have statistically significant impact on GDP per capita, and determine how powerful factor of GDP per capita is the ICT Development Index in comparison to other factors. The authors also suggest that future research examine the impact of ICT Development Index on some other economic factors such as unemployment rate, the amount of exports etc.

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