ELIT
Economic Laboratory Transition
Research Podgorica

Montenegrin Journal of Economics

Linhartova, V. (2021), "Analyzing the Role of Public Expenditures in Human Development: Panel Data Analysis of EU-28 Countries",
Montenegrin Journal of Economics, Vol. 17, No. 1, pp. 85-96.

Analyzing the Role of Public Expenditures in Human Development: Panel Data Analysis of EU-28 Countries

VERONIKA LINHARTOVA[1]

[1] Assistant Professor, Department of Economic Sciences, Faculty of Economics and Administration, University of Pardubice, Czech Republic, e-mail: veronika.linhartova@upce.cz

ARTICLE INFO

Received April 24, 2020
Revised from May 29, 2020
Accepted July 30, 2020
Available online March 15, 2021

JEL classification: C23, H42, H50, O15

DOI: 10.14254/1800-5845/2021.17-1.6

Keywords:

Public expenditures,
Human Development Index,
panel data,
EU member countries,
fixed effects model.

ABSTRACT

A number of studies have already shown that public expenditure in human capital development is the investment with the highest return in the form of higher economic performance. National governments are fully aware of this, and they are seeking to stimulate human capital and encourage its development. The aim of this paper was to verify whether public expenditure in areas producing goods and services developing human capital really contributes to its development in EU-28 member countries. The COFOG government expenditure and the Human development index are the variables that were chosen for this analysis. The panel data analysis for the sample of the 28 EU countries in the period 1995-2018 was applied to test the hypotheses. Hausman test recommended a model with fixed effects as the most suitable method for performing the analysis. The panel estimation of the relationship between public spending and human development proved that public spending has both positive and negative impact on human development. The model with fixed effects showed that public expenditure on recreation, culture, and religion has the highest positive effect on human development, followed by health, social protection, housing and community amenities in descending order. A negative statistically significant impact on human capital development was demonstrated for public spending on environmental protection. The analysis of panel data showed that some areas of public expenditure cultivate human capital, while some areas of public expenditure may have the opposite effect.

INTRODUCTION

Human capital, as measured by level of education, is commonly considered to be one of the key variables supporting economic growth (Gangal et al., 2013; Westlund et. al., 2010). Investment in human capital is considered to be one of the most important types of investment, providing the highest rate of return in terms of output. Growth models such as those by Romer (1972) and Lucas (1988) emphasize investment in human capital as an important factor contributing to long-term growth. Florida (2002)

introduced a new theory of regional economic growth based on the role of the creative class, composed of creative and innovative workers and characterized by high levels of productivity. According to Florida, national economies with workers showing a higher level of creativity grow the fastest. Creating a creative workforce is now considered a collective process, having overturned the romantic view of creative genius – once considered a gift from the gods and thus uninfluenced by the surrounding social context.

Providing people with educational, health-oriented, cultural, and athletic activities is one of the main ways to improve the quality of human resources. For many years, numerous studies and public policies around the world have been concerned with cultivating human capital in relation to the economy and its performance via education, culture, health, and other sectors. However, this relationship takes different forms in different countries and regions. In addition, studies initially used approaches that were sociological and primarily theoretical. Only relatively recently have these sectors been studied formally from an economic or statistical perspective. For the same reason, cultural sector-specific policies have been a subject of debate for roughly the last 10 to 15 years as policies for generating significant economic momentum and supporting the growth of macroeconomic indicators.

The Human Development Index emphasizes that countries are implementing policies that encourage the use of national economic wealth to increase their population's capital. The intended result is for these national resources to be channeled into human development projects that will provide real national development. This paper takes this assumption and uses it to explore the impact of government spending on cultivating human capital. Specifically, this paper's main objective is to analyze the impact of government spending on human development in the EU-28 countries for the period of 1995 to 2018.

1. LITERATURE REVIEW

In the 21st century, human capital has become a natural part of a production factors. It is no longer only land, labor, and capital but also the collective unique abilities of individuals – both innate and acquired – that result in the production of goods and services. Additionally, these may be suitably expanded and cultured. The original concept of capital as being exclusively physical (e.g., Solow, Samuelson, and Nicks) has been gradually extended since the mid-20th century by representatives of the so-called Chicago school to include the concept of human capital (e.g., Becker, Schultz, Friedman). Subsequently, the theory of human capital was developed in relation to economic growth and the economics of the workforce. Answers were sought as to whether developing human wealth contributed to the growth of national wealth, what the return on investment in human capital was, how education affected the distribution of income in society, etc.

In his book *The Economic Value of Education*, Theodore Schultz (1963) was one of the very first to address the concept of human capital in a way that assessed its contributions. This term gained greater importance in the late 1980s and early 1990s, and there has been a shift in contemporary economic analysis from the perception of capital as being physical to its being perceived as the productive quality of human beings, i.e., their quality. New growth theories have emphasized that through education, learning, and skill creation, people can become more productive, contributing significantly to the process of economic growth (Barro, 1999). Economic growth studies have examined the experience of Japan and the newly industrialized countries of East Asia, Europe, and North America and emphasized the role of human capital to a greater extent than before. This new emphasis on human capital has been strengthened by certain international financial institutions' analytical work on the education sector (Westlund et al., 2010; Weckroth et al., 2016).

The Organization for Economic Co-operation and Development (OECD) defines human capital as *"the knowledge, skills, competencies and attributes embodied in individuals that facilitate the creation of personal, social and economic well-being"* (OECD, 2001).

Another significant event occurred in the area of theory at the beginning of the 1990s. Work by Amartya Sen (2000) and others on human capabilities resulted in the gradual emergence of the human development paradigm, which is partially reflected in the Human Development Reports (UNDP), and the

frequently used Human Development Index (HDI). In fact, "human development" has become a very popular term since 1990, even becoming popular with international financial institutions. Some of these have even established special “development” departments or programs. The term “human development” is much broader than the concept of human capital. Human capital treats humans as just another resource, like land or buildings (fixed capital) or inventory (variable capital). Rather, human development is the overall process of broadening human skills and giving individuals the opportunity to grow, either as part of an organization or at a personal level. According to Edeme (2014) an *„access of the people to basic amenities such as health care facilities, quality education, affordable and decent housing and sustainable environment are fundamental to an enhanced quality of life which is a manifestation of human development“*.

Emerging evidence is rapidly increasing to support the role and importance of investment in human capital via education, health, culture, and sports within the economic development process targeting sustainable growth and development. It has been found that a population’s physical and mental condition contributes to economic growth no matter which nation is concerned. It is important to stress that the importance of the education system, health care, and other economic sectors in cultivating human capital is crucial to any labor market (Alam, 2012; Florida, 2002). Success in a modern, knowledge-based economy requires individuals to have a wide range of skills, motivations, and abilities. These characteristics are built into the populations of nations, regions, or cities and can generally be described as human capital. The next question is how to define and quantify human capital. Richard Florida, who focused on expanding the notion of human capital based on education, claimed that society’s economic performance depends primarily on individuals’ creativity (Florida, 2002). From the perspective of the knowledge-based economy, human capital is currently made up not only of education but also of a skill set acquired through cultural goods (Bourdieu, 2005; Hofstede, 1980), cultivating human physical potential via health or sports (Lee et al., 2013), and many other means.

According to Lee (2013), the population’s education and health are the basis of economic growth and development and are one of the key determinants of economic performance at both the micro and macro levels. This stems from the fact that education and health are both a direct part of human well-being and a form of human capital that enhances an individual’s abilities. A population’s condition is a decisive production factor and stressed the intrinsic value of investment in education and health. Health investments offer a high return on economic growth. This means that increasing healthcare spending not only has a major impact on decreasing possible treatment costs in the field of preventing patient neglect but also on increasing human productivity growth by improving the population’s condition.

Literature on the relationship between culture and economics is clearly a persistent theme in the social sciences, dating back to the classical work by Max Weber, who argued that institutional and cultural conditions define economic subjects’ motivational structure. Bucci and Serge (2011) also demonstrated the positive impact that investment in culture had on economic growth by studying skills acquired in OECD countries. Pierre Bourdieu (2005), who analyzed different degrees of social, economic, and cultural capital, also shares these conclusions about culture’s impact on economic performance. Another contribution to this area was made by social psychologist Geert Hofstede (1980), who defined culture as the *"collective programming of the mind of individuals"* and a *"shared system of meanings"* that affects the population’s mental and physical well-being and is ultimately reflected in their work performance. Huggins and Thompson (2015) claim that *"...culture is part of local development systems combining economic performance with social well-being."* Other authors define the role of local cultural characteristics as *“the local people's climate”* (Florida, 2002), *“the regional self”* (Syssner, 2009), and *“the established values of society”* (Horlings, 2015). Common to all these concepts is that they refer to a locally shared system of rules and values that ultimately affects the economic performance of individual countries.

The cultural sector’s contribution to gross domestic product can be divided into two categories. Countries with mid to low economic development – such as Colombia, Ecuador, Paraguay, and Venezuela – show a very similar percentage for the cultural sector's contribution to GDP, at around 2%. Countries with moderately higher indices of development – such as Argentina, Brazil, Chile, and Uruguay – show slightly higher than average rates, although they show distinct variation (a maximum of 6.7% for Brazil and a minimum of 2% for Chile). Finally, in the United States, the cultural sector was found to contribute

to GDP growth by 7.75% (Huggins et al., 2015). Yesufu (2000) examined the link between investment in human capital and economic growth in Nigeria. More specifically, this study examined the causal link between investment in human capital and economic growth for 1975 to 2005 using the integrated error correction model (ECM) technique. The study's results showed directional causality between investment in human capital and economic growth. It is therefore recommended that the government increase its budget for sectors cultivating human capital and intensify joint efforts on the part of all stakeholders – all levels of government, NGOs, and the organized private sector – to improve education and health facilities for sustainable economic growth.

Chete and Adeoye (2002), used regression analysis to study the empirical mechanics by which human capital affects economic growth in Nigeria. The authors demonstrated a positive impact but stressed that though the various governments of Nigeria had always expected human capital would positively impact economic growth, the capital spending on education and health was too low for the outcome to be considered significant. Gangal and Gupta (2013) investigated how government spending on "cultivation" services impacted India's economic growth using time series data from 1998 to 2012. The study used co-integration and the assessment of Granger causality. The outcome indicated a stable long-term relationship between public spending and economic growth, and it was found that public spending had both positive and significant impact on economic growth. Lahirushan and Gunsekara (2015) conducted panel analysis for certain Asian countries from 1970 to 2013 to examine the impact of government spending on the countries' economic growth (Bhutan, China, India, Japan, Malaysia, Singapore, Sri Lanka, South Korea, and Thailand). The random effects in the ordinary least squares model indicated that government spending has a long-term relationship with and significant positive impact on economic growth in this region of Asia. Kwendo and Muturi (2015) used panel data from 1995 to 2010 and a Hausman test to demonstrate the impact of public spending on economic growth in Burundi, Kenya, Rwanda, Tanzania, and Portugal. In particular, public health expenditure had a demonstrable positive impact on economic growth in these countries.

Musa and Jelilov (2016) also used the OLS method to investigate the impact of government spending on economic growth in Nigeria for 1981 to 2012. The study showed that government spending significantly and positively affected economic growth. Omodero (2018) expanded on this study for Nigeria from 1999 to 2016, but focused on how government spending on education, health, and defense and security affected GDP. Based on the results of this study, she suggested redirecting government resources towards education and health care, which could truly help boost the country's economic growth. According to Alam (2012), a 1% increase in the quality of human capital should be reflected in Pakistan's economic development by as much as 2.38%.

2. MATERIALS AND METHODS

The aim of this paper is to analyze the impact of individual components of public expenditure on human capital in the EU-28 member countries. Particular attention has been paid to the impact of expenditure on economic sectors that, based on the literature review, cultivate human capital; this public spending should thus be reflected in the country's human capital development.

2.1 Data

The particular measures of the explanatory variables came from a variety of resources. The analysis used a time series of 24 years, from 1995 to 2018. The variables used in the analysis are the Human Development Index (hereinafter referred to as HDI) and the Classification of the Functions of Government (hereinafter referred to as COFOG) in the EU-28 countries.

The COFOG classification categorizes individual government institutions' functions with regards to their expenditure. For the purposes of this analysis, the individual components of government expenditure are expressed in millions of EUR. Data on government expenditure were obtained from the Eurostat website (Eurostat, 2020). The CZ-COFOG classification is mainly used to determine government provided expenditure according to function that benefits both individual households (individual

consumption) and collective expenditure (collective consumption). COFOG expenditure is often divided into two groups. Productive government spending usually includes that which contributes to improving human capital (especially education and health) and promoting technological progress, infrastructure, and communication. Non-productive government expenditure is primarily considered to be social expenditure and transfers (Mazúrová & Kollár, 2015). Edeme (2014) note that these unproductive costs can slow economic growth by reducing incentives to work, reducing investment in human capital, and crowding out private investment. On the other hand, social spending provides an appropriate institutional environment.

In this article, human development is defined by three components (life expectancy, gross enrollment, and GNI per capita); the UNDP defines these as basic indicators of human development and quantifies them with the help of the Human Development Index. The Human Development Index is a statistical tool that is used to generally assess a nation's social situation as well as its economic results, including further impact. The country's social and economic dimension focuses on people's health, educational achievements and living standards. The Human Development Index is one of the best tools for monitoring a country's level of development, because it combines all the major social and economic indicators responsible for a nation's economic development. The Human Development Index uses values from zero to one, where higher values represent better human capital development for a given country (UNDP, 2018).

2.2 Methods

To pursue the above research objective, the following null hypothesis was formulated:

H_0: There is no significant relationship between recurrent government expenditure and the HDI in the EU-28 countries.

The validity of the hypothesis will be verified on a panel data set. Due to the specific nature of this data, it was necessary to use tools suitable for working with this type of data in this paper. A panel data set consisting of observations from 28 countries for the years 1995 – 2018 was assembled. Because of greater information set in panel data, the panel analysis is a good direction to address the multicollinearity problem, and it also allows dealing with the endogeneity and measurement error of various variables. It also enables to account for heterogeneity by including time-invariant variables. Due to the fixed number of observed units (countries) in time, the resulting panel data set is balanced and it is possible to use classic tools for estimating models with panel data (Baltagi, 2005). Greene (2003) considers the basic regression model of panel data to be the model:

$$y_{it} = \beta_1 x_{it1} + \beta_2 x_{it2} + \ldots + \beta_k x_{itk} + \alpha_1 z_{i1} + \alpha_2 z_{i2}\, \alpha_3 + \ldots + \alpha_q z_{iq} + u_{it} \quad (1)$$

where the index i denotes the cross-sectional dimension i = 1,..., n, the index t the time dimension t = 1,..., t, the variables x_1 to x_k are explanatory variables not including the vector of units and the variables z_1 to z_q represent individual effects - diversity that can be distinguish an individual or a whole group from other entities - a possible vector of units is included here. Individual effects do not change over time.

Based on the above framework, we will distinguish and show how three cases are estimated:

- **Pooled Regression** - if the individual effect is only a vector units, which means that a single parameter α is a common constant:

$$y_{it} = \alpha + \beta_1 x_{it1} + \beta_2 x_{it2} + \ldots + \beta_k x_{itk} + u_{it} \quad (2)$$

- **Fixed Effects Model (FEM)** - if the individual effects z_1 to z_q are unobservable but correlated with explanatory variables, then the solution is to include all effects in the predictable conditional average using the relation $\alpha_i = \alpha_1 z_{i1} + \alpha_2 z_{i2}\, \alpha_3 + \ldots + \alpha_q z_{iq}$ and the FEM model has the form:

$$y_{it} = \alpha_i + \beta_1 x_{it1} + \beta_2 x_{it2} + \ldots + \beta_k x_{itk} + u_{it} \quad (3)$$

fixed effect α_i means a specific constant for each cross-sectional unit,

– **Random Effects Model (REM)** - if the individual effects z_1 to z_q are unobservable but not correlated with the explanatory variables, then the solution is a random component $e_i + u_{it}$, which in addition to the original assumes a specific random component for each cross-sectional unit and model REM has the shape:

$$y_{it} = \beta_1 x_{it1} + \beta_2 x_{it2} + \ldots + \beta_k x_{itk} + (\alpha + e_i) + u_{it} \quad (4)$$

Before being applied, it was necessary for the estimated econometric model to be verified and evaluated. If the required assumptions are not met, then parameter estimates lose the required properties and statistical tests lose their validity because they provide unrealistic conclusions. For this purpose, the typical assumptions that econometrics applies to regression errors are used, i.e., the error term ϵ_i is expressed as follows (Greene, 2003):

– $E(\epsilon_i) = 0$. The error term has a zero mean.
– $var(\epsilon_i) = E(\epsilon_i^2) = \sigma^2$. There is constant variance of the error term (homoscedasticity).
– $cov(\epsilon_i; \epsilon_j) = 0$ for $i \neq j$. The error terms are uncorrelated.
– ϵ_i, the error term, is normally distributed.
– X_i is fixed; it is not a random variable.

As mentioned above, the hypothesis of the impact of government expenditures on human capital development was tested on a sample of EU-28 Member States using an econometric model. The 24-year data series is the longest time series for which the selected data are available. The length of the period is also sufficient to show the possible influence of independent variables on the dependent variable. An overview of the basic statistics of the final dataset is presented in Table 1.

Table 1. Descriptive statistics of used variables

Variable	Mean	Median	Std. Dev.	Min	Max
HDI	0,842	0,849	0,0556	0,673	0,942
General Public Services	2,90e+004	1,00e+004	4,52e+004	125,00	1,89e+005
Defence	6,22e+003	1,74e+003	1,09e+004	25,60	5,37e+004
Public order and safety	7,39e+003	2,47e+003	1,19e+004	41,70	5,21e+004
Economic affairs	1,86e+004	7,22e+003	2,81e+004	153,00	2,20e+005
Environmental protection	3,30e+003	840,00	5,32e+003	38,10	2,78e+004
Housing and community	3,33e+003	944,00	5,87e+003	1,70	2,88e+004
Health	2,84e+004	8,95e+003	4,75e+004	108,00	2,42e+005
Recreation, culture and religion	4,69e+003	1,54e+003	7,35e+003	14,40	3,52e+004
Education	2,09e+004	7,64e+003	3,21e+004	142,00	1,39e+005
Social protection	7,82e+004	2,26e+004	1,31e+005	327,20	6,50e+005

Source: Own compilation based on Eurostat (2020) and UNDP (2018)

Table 2. Description of the Variables Used

Variable	*Description of the Variable*	*(Non-)Stacionarity*	*Positive/Negative*
i	Respective country		
t	Respective year		
HDI	Human Development Index	Stacionarity	
GenPS	Expenditure on general public services	Non-stacionarity	Positive
I_GenPS		Stacionarity	

Def	Expenditure on Defense	Non-stacionarity	Positive
l_Def		Stacionarity	
POS	Expenditure on Public Order and Safety	Non-stacionarity	Positive
l_POS		Stacionarity	
EA	Expenditure on Economic Affairs	Non-stacionarity	Positive
l_EA		Stacionarity	
EP	Expenditure on Environmental Protection	Non-stacionarity	Positive
l_EP		Stacionarity	
Hous	Expenditure on Housing and Community Amenities	Non-stacionarity	Positive
l_Hous		Stacionarity	
Health	Expenditure on Health Care	Non-stacionarity	Positive
l_Health		Stacionarity	
RCR	Expenditure on Recreation, Culture, and Religion	Non-stacionarity	Positive
l_RCR		Stacionarity	
Edu	Expenditure on Education	Non-stacionarity	Positive
l_Edu		Stacionarity	
SP	Expenditure on Social Protection	Non-stacionarity	Positive
l_SP		Stacionarity	

Source: Own compilation

The analysis works with panel data, which are a combination of cross-sectional and time series, so it was necessary to test the stationarity of all variables at the very beginning. The concept of stationarity or non-stationarity refers to the absence or presence of a trend. For the purposes of this analysis, it was important that all variables be relatively stable around the mean and variance over time, otherwise the regression model estimates could be skewed in terms of apparent regression. Stationarity was tested using the Dieckey Fuller unit root test, which is used to test stationarity. The stacionarity test results are contained in the following Table 2.

As can be seen from the table, most of the variables were non-stationary and therefore needed to be stationary. For non-stationary variables, which were expressed in monetary units, logarithimization was performed. If the non-stationarity of the variable persisted, a difference would be added. However, this was not necessary and the mere logarithmization of non-stationary variables turned them into a stationary form. Based on the conclusions of the studies presented in the previous text of the paper, a positive effect on the development of human capital can be assumed for all individual government expenditures. Thus, with the increasing volume of public expenditures, there should be an increasing value of the Human Development Index. A description of the individual variables is presented in Table 2.

After testing the variables' stationarity, the model was constructed as follows:

$$HDI_{it} = ß_0 + ß_1 l\_GenPS_{it} + ß_2 l\_Def_{it} + ß_3 l\_POS_{it} + ß_4 l_{EA_{it}} + ß_5 l_{EP_{it}} + ß_6 l\_Hous_{it} + ß_7 l\_Health_{it} + ß_8 l\_RCR + ß_9 l_{Edu_{it}} + ß_{10} l\_SP_{it} \quad (5)$$

where HDI is the Human Development Index value, It appears in the model as an explained variable,

l_GenPS is expenditure on general public services,
l_Def is expenditure on defense,
l_POS is expenditure on public order and safety,
l_EA is expenditure on economic affairs,
l_EP is expenditure on environmental protection,
l_Hous is expenditure on housing and community amenities,
l_Health is expenditure on health care,
l_RCR is expenditure on recreation, culture, and religion,
l_Edu is expenditure on education, and
l_SP is expenditure on social protection.

Many economic analyzes work with data that have a time dimension as well as a cross-sectional unit. These are referred to as panel data and are also used in this analysis. The analysis of panel data requires work with suitable tools for this type of data, the key ones include a model with fixed effects and a model with random effects. In some cases, we may encounter the use of the classical Pooled regression model, which is, however, completely unsuitable for most panel data (Baltagi, 2005). Formal recommendations on the suitability of these tools are given by panel diagnostics tests.

To analyze human capital development and government spending using selected variables, panel diagnostics tests in two cases recommended the use of a Fixed effects model, while one of the tests recommended a Random effects model. However, the tests clearly rejected the use of the classical regression model, which is probably not suitable due to the large set of relatively different countries. Several steps were performed to select a suitable model. As a first step, a test was performed to see if it was more appropriate to use the Pooled Regression model or the model with Random effects. At the 5% level of significance, a low p-value counts against the null hypothesis that the Pooled OLS model is adequate, in favor of the fixed effects alternative. The Breusch-Pagan statistics helped to decide between Pooled OLS model and Random effects alternative. At the 5% level of significance, the null hypothesis of the unsuitability of Random Effects Model was rejected, ie the model with random effects was preferred to the Pooled Regression model. The next step was to compare the suitability of Random Effects Model and Fixed Effects Model. The test to compare the suitability of using these models uses the so-called Hausman test. The results of the Hausman test suggest that it is appropriate to prefer Fixed Effects Model over Random Effects Model at the 5% level of significance.

With regard to the results of panel diagnostics tests, parameter estimates were performed in the analysis using a model with fixed effects, while a model with random effects was chosen for the control models. Although the fixed effects estimate was chosen, the results obtained by the random effects estimate did not differ significantly. All estimates were made in the Gretl econometric program.

2.2.1 Statistical and econometric verification

The significance of the model was tested using an F-test. In all cases, the p-value was lower than the level of significance, and therefore it was possible to accept the hypothesis of the statistical significance of the model as a whole for all models used.

The first so-called classical assumption of the regression model is that the random components have an identical distribution with zero mean value in all selections. This assumption was tested using residue normality tests. In most of the above models, the p-value was less than the 0.05 significance level, so the hypothesis of a normal distribution of random components was rejected.

In order for the Gauss-Mark assumptions to be met, the variance of the random component of the model must be homoscedastic, that is, it must be finite and constant. Another assumption is that the random component should have the character of uncorrelated random variables. Both of these assumptions were treated using robust standard error (HAC) estimation, which addresses the consequences of autocorrelation and heteroscedasticity. Therefore, econometric estimates are not affected by the consequences of autocorrelation and heteroscedasticity.

One of the classical requirements for estimating the parameters of a linear regression model using MNC is the linear independence of all columns of the matrix X. This means that the explanatory variables are not burdened by high collinearity or multicollinearity. Multicollinearity was tested using the VIF test, where no value exceeded 10, so it can be stated that the collinearity is tolerable in these models.

3. RESULTS AND DISCUSSION

The estimation of parameters according to the model constructed above was performed using a model with fixed effects. As can be seen from the Table 3, not all variables show a positive sign for the coefficient, as assumed when specifying the variables. For this reason, it was appropriate to verify their direction of action using a control model, or a model with random effects.

The model with random effects just confirmed the results of the Fixed effects model. The coefficient of determination was 0.96 for the Fixed effects model and 0.66 for the Random effects model. The first model thus explains 96% of the variability and the second 66% of the variability of the explained HDI variable. Both models were found to be statistically significant at the 5% level of significance (with p-values of $3.5e^{-147}$ and $1.04e^{-84}$). The results of panel data analysis show that for the period under review, human capital development was influenced mainly by spending on housing and community amenities ***(l_Hous)***, health care (***l_Health)***, recreation, culture, religion (***l_RCR)*** and social protection (***l_SP)***. In all four areas of government expenditure, the strong statistical significance of their impact on human capital development was confirmed, at a significance level of 0.01. The development of human capital in the Member States is also influenced by government expenditures on economic affairs (***l_EA)*** at the level of significance of 0.1, resp. 0.05 according to the Model with random effects. The last variables that have been shown to have an effect on human capital development is environmental protection expenditure (***l_EP)*** and education (***l_Edu***), at a 0.1 significance level.

Table 3. The effect of government spending on Human development

HDI								
	Fixed Effects Model				*Random Effects Model*			
	Coefficient	*Std. Error*	*t-ratio*		*Coefficient*	*Std. Error*	*t-ratio*	
l_GenPS	0,1748	0,0169	10,3300		0,3146	0,0195	16,1200	
l_Def	-0,0011	0,0028	-0,3789		-0,0105	0,0034	-1,1010	
l_POS	0,0009	0,0022	0,4092		0,0072	0,0027	2,6920	
l_EA	0,0031	0,0038	0,8193	*	0,0046	0,0046	0,9997	**
l_EP	-0,0038	0,0022	-1,6920	*	-0,0056	0,0028	-2,0380	*
l_Hous	0,0047	0,0018	2,5960	***	0,0009	0,0015	0,5986	***
l_Health	0,0093	0,0012	7,7720	***	0,0111	0,0015	7,5050	***
l_RCR	0,0193	0,0046	4,2230	***	0,0302	0,0055	5,4510	***
l_Edu	0,0039	0,0029	4,8320	*	0,0012	0,0035	6,0460	*
l_SP	0,0079	0,0058	1,3740	***	0,0041	0,0070	0,5847	***

***, **, and * represent statistical significance at the 1%, 5%, and 10% levels, respectively. Standard errors are in parentheses.

Source: Own compilation based on Eurostat (2020) and UNDP (2018)

In relative terms, an increase of housing and community amenities spending by one percent will increase human development by 0,0047 percentage point. Similarly, a one percent increase in health expenditure can lead to a significant improvement in human development equally 0,0093 percentage point. The coefficient of recreation, culture, and religion expenditure portrays that if expenditure increases by one percent, human development increases by 0,0193 percentage point; an increase in social protection expenditure by one percent decreases human development by 0,0079 percentage point and an increase in education expenditure can lead to an improvement in human development equally 0,0039 percentage point.

In terms of magnitude, recreation, culture, and religion has the highest impact. A proportionate increase in expenditure in other sectors may help improve human development, though to a much smaller magnitude as compared to culture that has the loudest impact.

The performed panel data analysis confirms the claims of the authors of the studies, who claim that culture has the most fundamental influence on the development of human capital (eg, Bucci et al., 2011; Bourdieu, 2005). According to these authors, people using cultural goods and services have the ability to

think outside the box, which this paper's author feels may contribute to accelerating the abilities and skills acquired during the educational process and to raising individuals' creativity much more than the knowledge base or the population's physical condition are able to do alone (Florida, 2002; Bourdieu, 2005; Hofstede, 1980).

The low statistical significance of the impact of public expenditure on education on human capital development is quite surprising. Many studies to this day emphasize the impact of education on human capital development. As mentioned in the introduction of this article, not only Florida (2002) sees the source of economic growth in the creativity of the workforce. Economic growth is thus derived from talented people who create the so-called creative force. Developed countries have moved from a knowledge economy to a creative economy. A prerequisite for the development of the creative economy is a certain degree of knowledge in the society, but above all the creativity of the workforce. Especially in developed countries, among which the EU-28 Member States undoubtedly belong, the educational structure of the population is very similar. Such states gain a competitive advantage especially in the area of creativity of their workforce. So it is not just education, but above all goods and services that develop the creativity of the workforce, which cultivate human capital.

Quite surprisingly, the panel data analysis showed that government spending on environmental protection had a negative impact. In practice, this suggests that increasing spending in this area slows down the development of human capital. Such a conclusion completely contradicts the Sapci and Shogren study (2018), which claims that poor environmental quality can slow economic growth due to a negative impact on human capital. The impact of environmental protection on the development of human capital has also been demonstrated. Currently, the development of initiatives dedicated to environmental protection, whether formal or informal, is growing. Some of them even directly involve the citizens themselves in their activities. These initiatives are supported by the public sector in most countries. By involving residents in activities such as cleaning public spaces, greater responsibility in waste sorting, etc. These activities only develop civic thinking about things in the public interest.

On the other hand, Alam (2012), for example, claims that *"the relationship between environmental degradation and economic development is complex, because the process of economic development is closely related to growth in industrialization and human activities while this growth in industrialization and human activities is clearly the main cause of increase in pollution."* According to the author, the effort to protect the environment through restrictions and other government measures complicates the process of economic development and thus also limits the development of human capital. Thus, public spending on one area of goods and services can often represent the opportunity cost of another area.

CONCLUSION

The development of human capital is currently one of the main goals of economies, regardless of their political establishment or economic maturity. At present, it is already clear that human capital is a variable determining the economic development of countries and thus represents the main competitive advantage of countries.

The panel estimation of the relationship between public spending and human development showed that public spending has both positive and negative impact on human development in EU countries. Using panel data of EU-28 member states from 1995-2018, this paper found that public spending on recreation, culture, and religion has the highest effect on human development, followed by health, social protection, housing and community amenities in descending order. The conclusions of the analysis only confirm the conclusions of many authors that public spending on so-called unproductive areas increases the cultivation of human capital (Kwendo and Muturi, 2015; Hasnul, 2015; Jelilov and Musa, 2016 and many others).

There is no simple recipe on how to develop human capital. Some empirical studies have shown a significant impact of educational activities, others demonstrate the fundamental impact of health care, and others favor the influence of culture. The performed analysis showed a positive effect of all the above-mentioned cultivation services. In the case of the EU countries with a predominance of recreation-

al, cultural and religious services. To simplified, government spending in this area was the most profitable investment in terms of human capital development in the period under review.

As has been mentioned several times, human capital is the sum of many different components. It is therefore necessary for them to be affected by the whole spectrum of cultivating partial economies, which complement each other and accelerate the effect of each other.

ACKNOWLEDGEMENT

This article was supported by the grant No. SGS_2020_18 of the Student Grant Competition in cooperation with Mr. Reinholf Agyei.

REFERENCES

Alam, S. (2012), *Does environmental degradation affect human development and sustainable economic development*? Case of Pakistan, Edited by Maria Lucia Seidl-de-Moura.

Baltagi, B.H. (2005), *Econometric Analysis of Panel Data*, 3rd ed., JohnWiley, NewYork.

Barro, R.J. (1999), "Human capital and growth in cross-country regressions", *Swedish Economic Policy Review*, Vol. 6, No. 2, pp. 237-277.

Bourdieu, P. (2005), *The social structures of the economy*, Polity.

Bucci, A., Segre, G. (2011), "Culture and human capital in a two-sector endogenous growth model", *Research in Economics*, Vol. 65, No. 4, pp. 279-293.

Edeme, R.K. (2014), "Analyzing the effects of sectoral public spending on human development in nigeria: evidence from panel data", *Journal of Humanities and Social Science*, Vol. 19, No. 9, pp. 1-13.

Eurostat (2020), *Government expenditure by function*, https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Government_expenditure_by_function_%E2%80%93_COFOG

Florida, R. (2002), "The rise of the creative class cities without gays and rock bands are losing the economic development race", *Washington Monthly*, Vol. 34, No. 5, pp. 15-26.

Gangal, V.L., Gupta, H. (2013), "Public expenditure and economic growth: A case study of India", *Global Journal of Management and Business Studies*, Vol. 3, No. 2, pp. 191-196.

Greene, W.H. (2003), *Econometric Analysis*, 4. Vyd, Prentice-Hall, New Jersey.

Hofstede, G. (1980), "Culture and organizations", *International Studies of Management & Organization*, Vol. 10, No. 4, pp. 15-41.

Horlings, L.G. (2015), "The inner dimension of sustainability: personal and cultural values", *Current Opinion in Environmental Sustainability*, Vol. 14, No. 1, pp. 163-169.

Huggins, R., Thompson, P. (2015). "Culture and place-based development: A socio-economic analysis", *Regional Studies*, Vol. 49, No. 1, pp. 130-159.

Chete, L.E., Adeoye, A. (2002), *Human resources development in Africa*, The Nigerian Economic.

King, M.L., Giles, D.E. eds. (2018), *Specification analysis in the linear model*, Routledge.

Kwendo, C. M., Muturi, W. (2015). "The effect of public expenditure on economic growth in the East African Community", *Journal of Business Management and Economics*, Vol. 3, No. 10, pp. 09-13.

Lahirushan, K.P., Gunasekara, W.G.V. (2015), "The impact of government expenditure on economic growth: A study of Asian countries", International Journal of Social, Behavioural, Educational, Economic, Business and Industrial Engineering, Vol. 9, No. 9, pp. 2995-3003.

Lee, S.P., Cornwell, T.B., Babiak, K. (2013), "Developing an instrument to measure the social impact of sport: Social capital, collective identities, health literacy, well-being and human capital", *Journal of Sport Management*, Vol. 27, No. 1, pp. 24-42.

Lucas, R.E. (1988), "On the mechanics of economic growth", *Journal of Monetary Economics*, Vol. 22, pp. 3–4.

Mazurova, B., Kollar, J. (2015), "The importance of government spending in context of fiscal policy", In Proceedings of the 1st international conference: *European Fiscal dialog 2015: Current Issues of Fiscal policy*, Prague, pp. 109-117.

Montgomery, D.C., Jennings, C.L., Kulahci, M. (2015), *Introduction to time series analysis and forecasting*, John Wiley & Sons.
Musa, M., Jelilov, G. (2016), "The impact of government expenditure on economic growth in Nigeria", *Sacha Journal of Policy and Strategic Studies*, Vol. 15, No. 2, pp. 15-23.
OECD. (2001), *The well-being of nations: The role of human and social capital*, OECD, Paris.
Omodero, C. O. (2018), "Public sector recurrent expenditure and national development in Nigeria", *Proceedings of the FMS National Conference*, University of Port Harcourt, Nigeria, pp. 71-83.
Romer, P. M. (1994), "The origins of Endogenous Growth", *The Journal of Economic Perspectives*, Vol. 8, No. 1, pp. 3-22.
Sapci, O., Shogren, J.F. (2018), "Environmental quality, human capital and growth", *Journal of Environmental Economics and Policy*, Vol. 7, No. 2, pp. 184-203.
Sen, A. (2000*), Development as Freedom*, Oxford University Press.
Schultz, T. W. (1963), *The economic value of education*, Columbia University Press.
Syssner, J. (2009), "Conceptualizations of culture and identity in regional policy", *Regional & federal studies*, Vol. 19, No. 3, pp. 437-458.
UNDP (2018), *Human development index trends, 1990-2017*. Human Development Report Office (HDRO), United Nations Development Programme, http://hdr.undp.org/.
Weckroth, M., Kemppainen, T. (2016), "Human capital, cultural values and economic performance in European regions", *Regional Studies, Regional Science*, Vol. 3, No. 1, pp. 239-257.
Yesufu, T. M. (2000), *The human factor in national development: Nigeria*, Spectrum Books Limited.