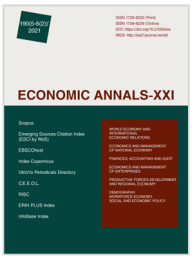

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Macroeconomic indicators and student mobility: a case study of the African countries most actively involved in FAO student mobility

Abstract
The internationalization of higher education is one of the most current topics related to education today. The number of foreign students in major higher education institutions is increasing, and international collaborations in the field of education and research are becoming more frequent. Even though the topic is so tangible in proximity, still little is known about the process of internationalization of higher education and the factors that support and hinder the phenomenon. The theoretical significance of this study is the regression analysis of the revealed literature and statistical data, while the practical significance is the possible comparative study of the research carried out in the international context depending on the number of FAO scholarship students coming to Hungary from African countries. The study covers 12 years of mobilities from 2008 to 2020. The study presents the distribution of FAO scholarship students arriving in Hungary from African countries and analyses a correlation between macroeconomic indicators, student mobility and the likelihood of international migration regarding sending African countries, using linear regression analysis and SPSS as a statistical method. For this analysis the data from the ILOSTAT Database has been used. The result of the study is that there are correlations between indicators in only a few cases, such as the HDI and MPI index of the African countries and GDP per capita. The GDP per capita has really strong positive correlation with the HDI index. There is a medium correlation between agriculture, forestry, and fishing, value added (% of GDP) and the employment in agriculture in the examined African countries. Also, our results suggest there is a moderately strong negative correlation between MPI index and GDP per capita.

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JEL Classification: F55; F62; I23; I25; Q19
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1. Introduction

In the 21st century, the world faces several global challenges, including the continued growth of its population. In fact, the world's global population is expected to rise to over 11 billion, and the impact of climate change will increase significantly in parallel. Due to climate change, we need to be prepared for the fact that the geographical and territorial structure of existing agro-ecological potential and product safety are expected to change. Processes may emerge that will increase migratory pressures on developed countries as a result of climate change. Numerous global challenges in the world will be concentrated in developing countries, and these will be the

areas where the achievements of the UN's 2030 Strategic Development Goals for Sustainable Development will be most questionable either regarding the eradication of poverty and hunger, or related to health, well-being, and quality education. In this respect, the development of human resources is of paramount importance, in which higher education, as part of educational activity, has always played a decisive role. The question for the whole planet is how the developing world can meet the challenges with greater efficiency than at present whose solution can be without exaggeration a defining milestone for stable sustainable development for both developing and developed countries. Magda et al. (2017) suggests that the continuity of labour supply in agriculture and food production requires a significant overhaul of the training system. Teaching up-to-date knowledge, the implementation of practice-oriented training, following technological development and increasing the proportion of managerial knowledge are necessary. The future brings significant challenges that need to be prepared for. With the development of science and technology, new challenges are emerging in education, knowledge is increasingly becoming an economic factor.

Globalisation has a positive impact on economic growth in sub-Saharan Africa and that the impact of globalisation is especially highly positive and significant for countries with scarce natural resources. In order to maximise the benefits of globalisation, African countries should stabilise their macroeconomic environment via good policies and implementation (Meyer, 2020; Chung et al., 2020).

According to Zelenkov and Lashkevich (2020), the development of human capital and the processes of acquiring and using knowledge in developing countries are rated higher on average, but the impact of knowledge on performance is low. The state of institutions is the main factor hindering the improvement of the quality of life in developing countries. Without increasing the level of development of institutions and encouraging other areas of innovative development (education, knowledge and technology, infrastructure), the value of HDI (Human Development Index) will decrease.

2. Brief Literature Review

Student mobility is one of the most visible elements of the internationalization of education (Byram & Dervin 2009, Lukács et al., 2020). Its basic goal is to strengthen and raise awareness of European identity. Secondly, student mobility aims to promote European cultural diversity and multiculturalism (King & Ruiz-Gelices, 2003). Thirdly, it is to benefit more effectively from the knowledge of employees with foreign work experience (Honvári, 2012). Finally, studying abroad has significant advantageous effects on students' learning processes and the development of their competencies (Bracht et al., 2006).

To start with, such theoretical knowledge may be acquired which is not provided by the sending institution or can be gained only at a lower level. Another positive argument is that social, economic and cultural experience can be gained in the host country. Another reason is that successful studies can be pursued in basically cross-border disciplines, professions (for example, international law, international business, etc.). Moreover, internationally comparable views can be learned. Additionally, students' scope can be extended and more nuanced through the experience gained from learning about different cultures. Finally, intercultural communication techniques can be mastered, and intercultural competencies can be developed.

Student mobility is a multi-billion-dollar industry: it accounts for USD 30 billion annually, or 3% of trade in services to OECD countries (Gargano, 2009).

The formation of territorial differences accompanies the history of mankind, since the migration of people and the concentration of the population have always derived from some economic, social, and natural factors. The regional differences of prehistoric period, and later the centres of cities formed due to the concentration of natural resources, had a significant effect on the further increase of territorial differences. The development of the Industrial Revolution gave a further impetus to this, and then the subsequent economic crises and world wars only deepened the already existing and perceptible territorial differences. Today, in most developing and transition countries, territorial and regional disparities are on the rise in terms of both economic activity and income, as well as social indicators.

2.1. International migration - brain drain or brain gain?

Since long, the analysis of international migration is receiving increasing interest in the international literature. Mainly, the increasing debates about international migration particularly reflect on

the mixed positive and negative impacts related to migration; especially, the impact of migration of highly skilled on the economic, social and cultural development of both sending and host countries. However, several analyses focus on employment migration (Bite et al., 2020). In particular, considerable controversy in the international literature appeared around two issues: Does migration lead to development or underdevelopment? Does the migration of highly skilled individuals lead to brain drain, or to brain gain (Satti & Nour, 2020)?

Conceptually, migration and mobility are sometimes used interchangeably and at other times treated as separate ideas. First, «mobility» can indicate shorter periods (less than twelve months) of geographical movement; consequently «migration» describes longer-term movements (more than twelve months). The latter timeframe is used by the United Nations and adopted by many, but not all, migration databases. For instance, the IOM (International Organization for Migration) uses a definition without a set time. The dichotomy between mobility and migration has been criticized for failing to describe how geographical movement can be initiated for one reason and continued for another, and how both permanent migration and return are sometimes planned but other times inadvertent. It is more useful to consider «mobility» as the ability for movement, something that many scholars have argued carries increasing importance in our time (Adu, 2019). In this study, in accordance with the UN definition, «migration» will be primarily used to mean longer-term, international movements (more than twelve months), as opposed to shorter-term «travel» and «mobility» will be reserved to mean «the ability to migrate internationally».

The factors that trigger movement must be kept in mind. Pull and push factors are important aspects of migration. For example, a person attempting to migrate from a given country may be «pushed out» by a seemingly unsolvable conflict, whether ethnic or religious, which is a constant phenomenon in many parts of Africa. Now, focusing on the more skilled layer, the push factors among other things can be interpreted as an overly inflexible system of government and the related employment policy which is not able to adequately address the problems of workers and unemployment itself; or discrimination on the basis of tribal/ community or ethnic origin; or even a decrease in real earnings, a weakening of the country's currency, and growing uncertainties in daily financial burdens and expenses, and thus daily «well-being» in general. Closely related to these are, for instance, the possibility of earning a higher income, the prospect of an expanded job mobility and career building, or even less bureaucracy and less control mechanisms, and, of course, a sustainable higher quality of life (Tarrósy, 2011). The present study explores the economic reasons for FAO scholarship holders from Africa to come to Hungary, looking for correlations between the macroeconomic indicators of sending countries and the number of mobilities.

2.2. The Food and Agriculture Organization of the United Nations (FAO) and Africa

The Food and Agriculture Organization of the United Nations (FAO) is a specialized agency of the United Nations whose main mission is to achieve food security. In this context, its key objectives are to reduce hunger and malnutrition, to combat poverty and ensure economic and social development for all, and to make sustainable use of natural resources (soil, water, air, genetic resources). FAO serves as a neutral forum for equal negotiations and professional cooperation between developed and developing countries. At the same time, it is a source of knowledge and information for the member states enhancing the development of their agriculture, fisheries and forestry, and in the provision of their food supply. Popp et al. (2019) suggest that current food supply systems will not be able to meet the growing demand for food in the African countries.

Exploring FAO goals, a strong focus on rural development ensures that no one is left behind, contributing to eradication of poverty, still mainly concentrated in rural areas; sustainable rural development also contributes to environmental sustainability, substantially contributing to restoration and sustainable management of natural resources and biodiversity, as well as ensuring economic growth, with agriculture development identified as the most effective. In fact, although agriculture can be the lead sector for overall growth in the agriculture-based countries, it has been vastly underused for development (The Medium Term Plan 2018-21 and Programme of Work and Budget 2020-21, 2019).

In 2008, FAO announced a scholarship program for foreign students in the fields of agricultural production development for five universities (Szent István University, University of Pannonia, Debrecen University, Kaposvár University, Corvinus University) in Hungary. The fellowship programme was launched in 2008 as part of the FAO-Hungary Host Country Agreement. Financed by

the Hungarian Government, it provides a unique learning opportunity for young specialists from selected countries in Eastern-Europe, Asia and Africa, to complete a master's degree in animal health, plant protection, rural development or other related fields. FAO provides technical advice on the selection of the fellows and participates in training activities.

It seems to be an obvious opportunity to capitalise on the still existing and probably less utilized higher education capacities in the training of foreign students. Between 2008 and 2020, 45 countries participated in the program, with a total of 339 students eligible for the scholarship (Figure 1). This study focuses on African countries, looking for the answer to whether there is a correlation between the value of non-financial indicators in each African sending country and the willingness and probability to move.

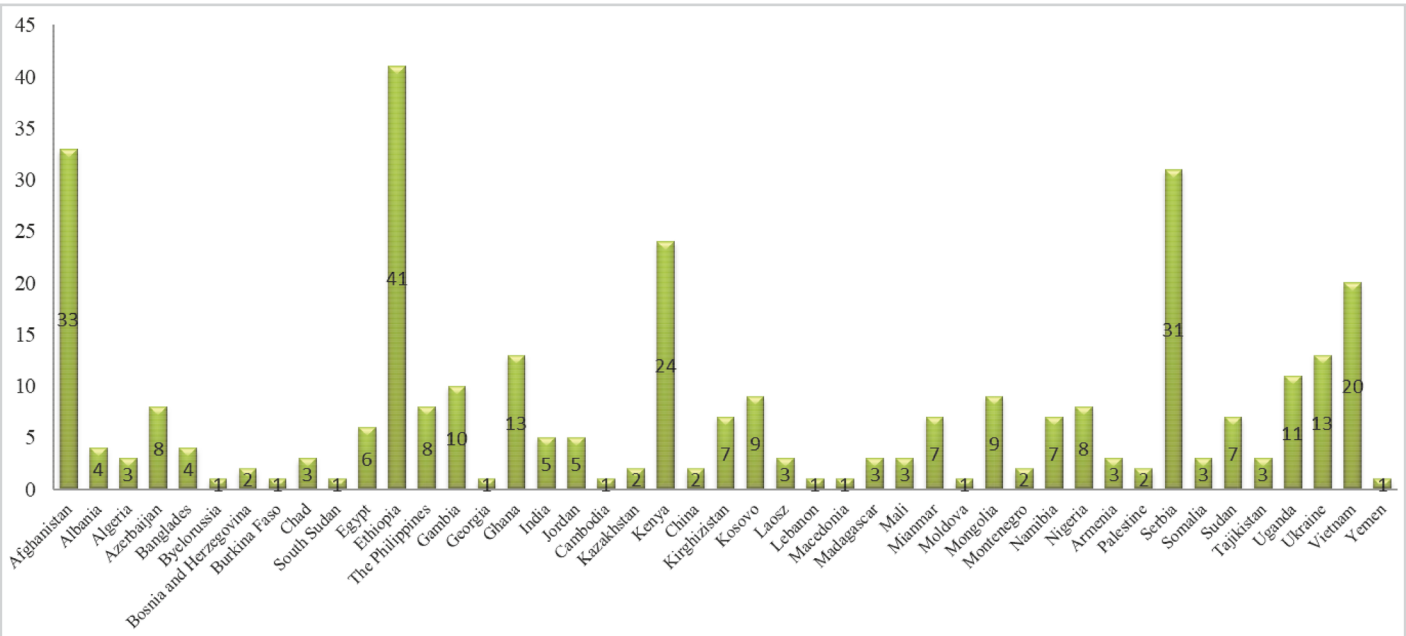

Figure 1:
Distribution of FAO students enrolled between 2008 and 2020 by the sending countries
Source: Own elaboration

3. Purpose and Methodology

The aim of the paper is to analyze the correlation and significant degree to which the examined variables are associated with each other. The macroeconomic indicators are the features of 2018 and 2019. For this analysis the data from the ILOSTAT Database has been used. Main focus is on those variables that are considerably influencing changes and impact on the mobility in African countries. The study covers 12 years of mobilities from 2008 to 2020. The paper presents the distribution of FAO scholarship students arriving in Hungary from African countries and analyse a correlation between the selected three macroeconomic indicators, student mobility and the likelihood of international migration regarding sending African countries, using linear regression analysis and SPSS (Statistical Program for Social Sciences) as a statistical method. I chose this methodology because this methodology assumes a linear relationship (in its parameters) between the explanatory and the explained variable. Linear regression analysis, which is one of the most applied statistical methods, is a method of predicting the values of another variable from the values of one or more variables, respectively. In the linear regression calculation, the data of the variables can be represented in a coordinate system, where the horizontal axis is the independent variable, and the vertical axis is the dependent variable. The related value pairs are presented on a point distribution model. During the analysis, we search for the line (regression line) that best fits the set of points. Most fitting means that the sum of the squares of the distances of each point in the vertical direction from the regression line, i.e., the errors, is as small as possible. By characterizing the regression line, we can describe the relationship between the variables.

The significance of the macroeconomic indicators used for this research are described in the following paragraphs. Examined variables are GDP (Gross Domestic Product), HDI (Human

Development Index), MPI (Multidimensional Poverty Index), agriculture, forestry, and fishing, value added (% of GDP) and employment in agriculture (%).

Macroeconomic Indicators Used for the Research

The most common indicator is Gross Domestic Product (GDP), which is the total value of goods and services produced in a country each year and intended for final consumption (domestic or foreign). In other words, it is equal to the Gross Domestic Income (GDI) achieved in the country in a given year.

The Human Development Index (HDI), introduced by the UN, has three dimensions: life expectancy, in which it is important to maintain health; education (from literacy to the number of graduates); ensuring an appropriate standard of living (income, purchasing power, etc.). Accordingly, countries may have vastly different GDP levels even with the same level of HDI and vice versa, i.e., some countries may have hugely different human development indicators with similar levels of income (Vértesy, 2015). If there is a linear relationship between the two criteria (their points fall on approximately the same imaginary line), then the so-called linear correlation coefficient can be used to quantify the strength and direction of the relationship.

The Multidimensional Poverty Index (MPI) includes the proportion of people living below a certain threshold in all dimensions of HDI - considering life expectancy, healthy living, access to education and an adequate standard of living (Vértesy, 2015).

4. Results

Our study covers the following 16 African countries (Figure 2): Algeria (North Africa), Burkina Faso (West Africa), Chad (Central Africa), South Sudan (East Africa), Egypt (North Africa), Ethiopia (East Africa), Gambia (West Africa), Ghana (West Africa), Kenya (East Africa), Madagascar, Mali (West Africa), Namibia (South Africa), Nigeria (West Africa), Somalia (East Africa), Sudan (North Africa), Uganda (East Africa). Due to the incomplete data, we excluded Somalia from some study samples.

Examining the territorial location of the sending countries within Africa, the question arises why these countries send students to developed countries, in the present case, to Hungary. Is there a correlation between certain macroeconomic indicators and the mobility tendencies or territorial orientation of students who have received an FAO scholarship?

Is there a correlation between population, GDP (Gross Domestic Product), HDI (Human Development Index), MPI (Multidimensional Poverty Index), agriculture, forestry, and fishing, value added (% of GDP) and employment in agriculture (%) and the willingness of FAO scholarship students to move, and its probability?

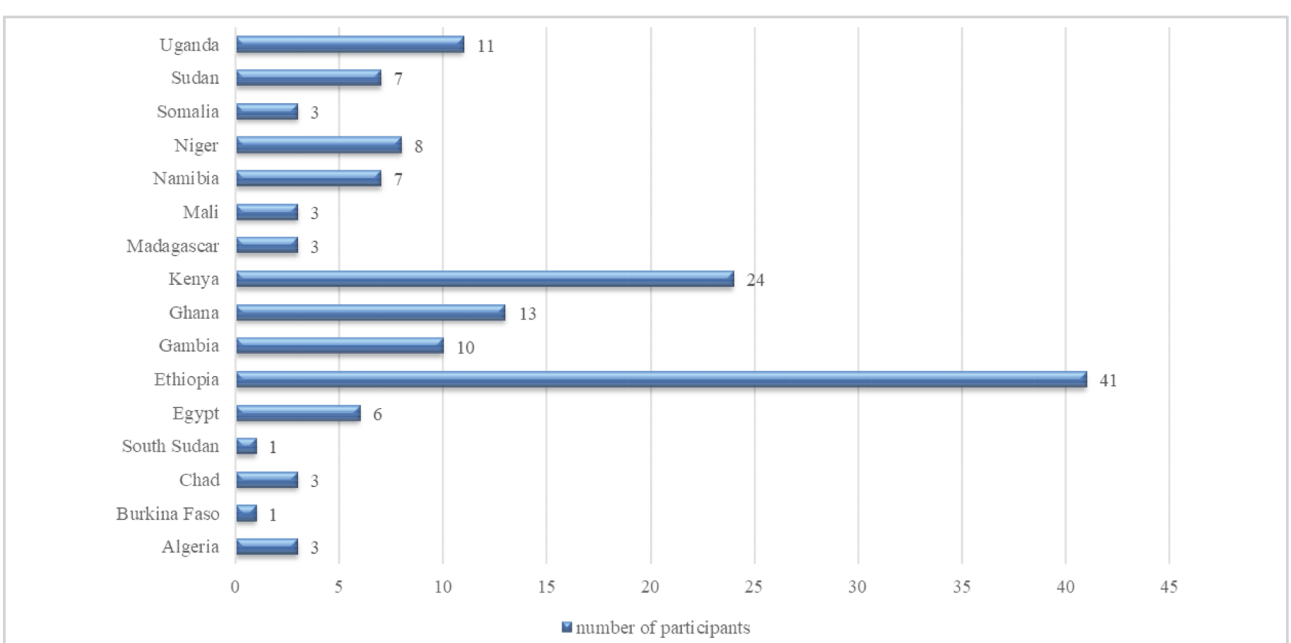

Figure 2:
Number of FAO scholarship-holders in Africa (2008-2020)
Source: Own elaboration

African higher education institutions in general have a marginalized position in knowledge production and dissemination processes. Since the 1980s, African higher education institutions have faced more serious challenges in many aspects of their development than any other region. The issue of brain drain, deteriorating quality and relevance of programs, huge enrolment pressure with limited infrastructure, poor research outputs and difficulty of coping up with global changes have been the main challenges of the sector since then. Moreover, for a lot of African countries, their sheer size, fragile socio-economic state, and poor educational infrastructure make their higher education sectors less competitive. As a result, African higher education institutions found themselves in a marginalized position in the process of knowledge production and dissemination (Woldegiorgis & Doevenspeck, 2015).

Enrolled college students in sub-Saharan Africa are three times more likely to study in their home countries than students in other regions, and their numbers have grown rapidly in recent years. In this region, 4% of 18-22-year-olds continue their studies in higher education (UNESCO, 2020). Although demographic and economic trends in Africa make it clear why the demand for higher education is increasing in the region, we know relatively little about which higher education institution students study at or about the consequences of outgoing student mobility for economic and social development in the region (Kritz, 2011). Of the 16 countries surveyed, only Algeria and Egypt are not sub-Saharan African countries. It is to be examined in a different study how these students utilize the knowledge gained abroad in addition to domestic mobility, and whether they return to their home country at all after graduation or are more oriented towards Western Europe.

As FAO program covers the agricultural field, the impacts of indicators measuring the role of the agricultural sector should be examined in the countries from which most students came to Hungary. The role of agriculture in the national economy has been examined based on the following indicators.

Agriculture remains the backbone of the Kenyan economy (Figure 3). It is the single most important sector in the economy, contributing approximately 34% of the GDP (ILOSTAT, 2019). Over 80% of the Kenyan population live in the rural areas and derive their livelihoods, directly or indirectly from agriculture. Given its importance, the performance of the sector is therefore reflected in the performance of the whole economy. The development of agriculture is also important for poverty reduction since most of the vulnerable groups like pastoralists, the landless, and subsistence farmers, also depend on agriculture as their main source of livelihoods. Growth in the sector is therefore expected to have a greater impact on a larger section of the population than any other sector. The development of the sector is therefore important for the development of the economy as a whole (Alila & Atieno, 2006).

The time series chart (Figure 4) shows that between 1981 and 2019, the contribution of agriculture to GDP decreased over the years in two countries (Ethiopia and Ghana), while it increased in

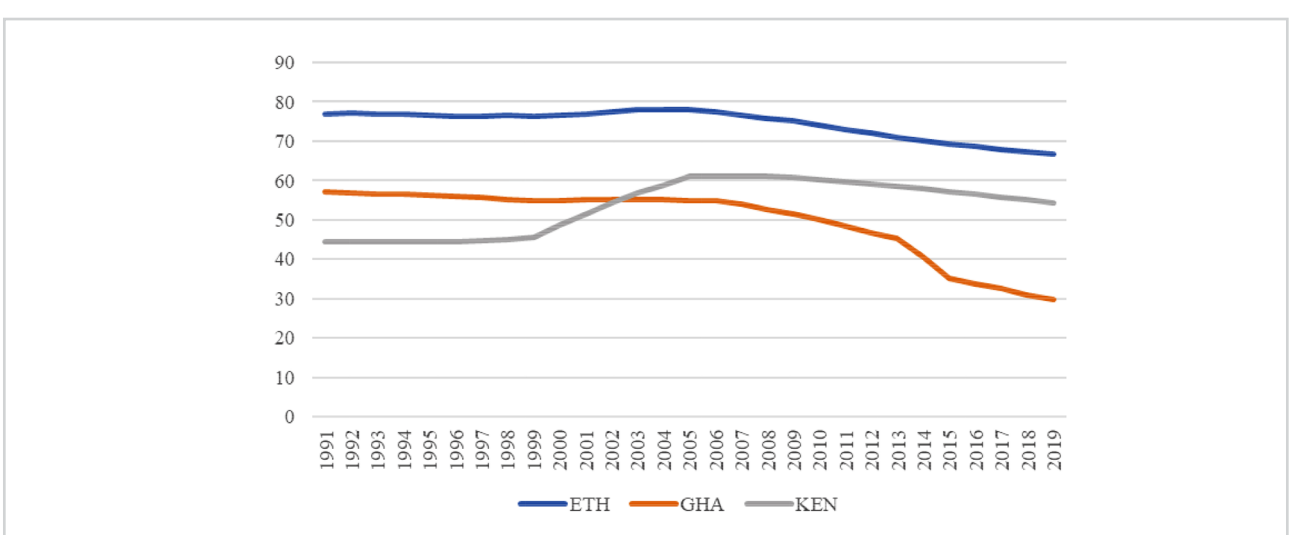

Figure 3:
Employment in agriculture (% of total employment) in countries that send the most FAO students
Source: International Labour Organization, ILOSTAT database (2020)

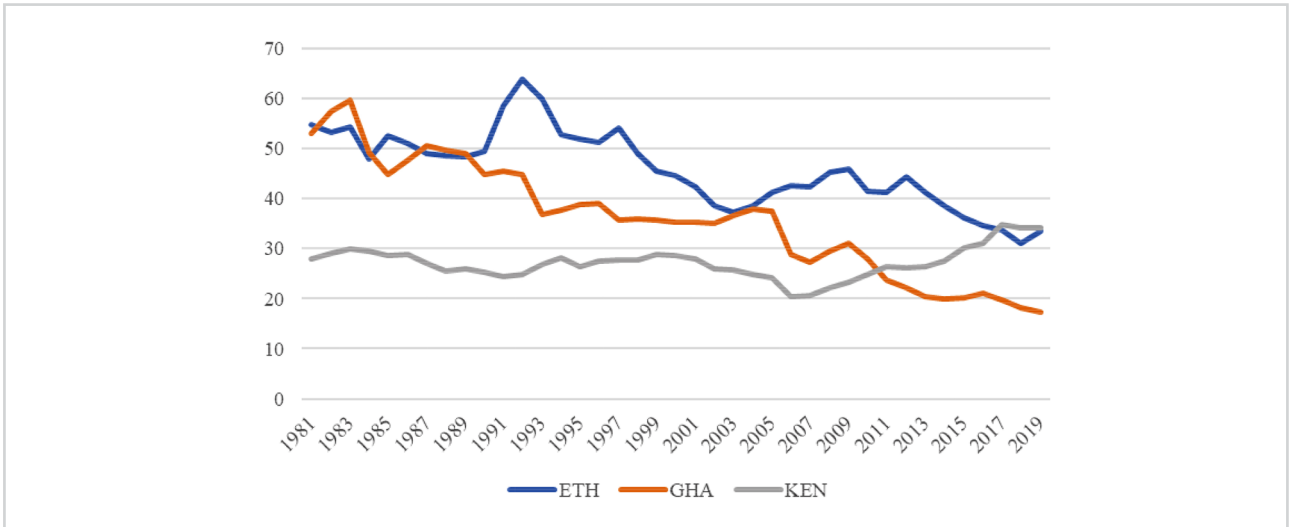

Figure 4:
Agriculture, forestry, and fishing, value added (% of GDP) in countries that send the most FAO students (1981-2019)
Source: International Labour Organization, ILOSTAT database (2020)

case of Kenya. In the world, the contribution of agriculture to gross value added is generally declining but has increased in case of Kenya. This fact should be examined in a separate study.

In these countries, agriculture plays a major role in added value. In case of Ethiopia and Kenya, more than 1/3 of all value added comes from agriculture. In general, the more developed a country is in the world, the lower the rate of its contribution to agriculture is.

Figure 5 clearly shows that Chad (TCD) has the highest share of employment in the agricultural sector, while the contribution of agriculture to GDP is also high. This can also be observed in the countries from which the most FAO students came to Hungary. Statistically, $r = 0.688$, a medium correlation can be established, so there is a proven significant relationship between the two indicators.

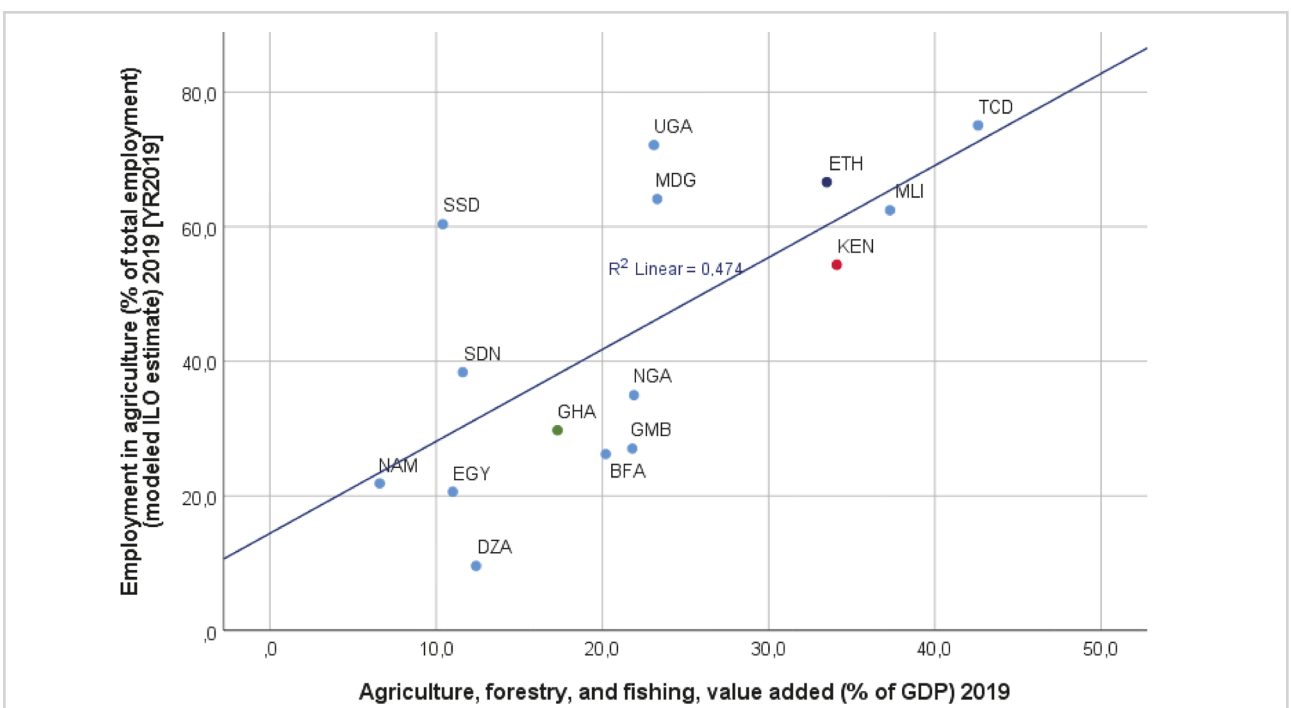

Figure 5:
Relationship of the employment in agriculture and agriculture, forestry, and fishing, value added (% of GDP) of the examined African countries
Source: International Labour Organization, ILOSTAT database (2020)

Most FAO students are from the following three countries: Ethiopia, Kenya, and Ghana. The HDI index of these countries with values of 0.470, 0.579, 0.596 is in the middle of the 16 countries studied (Figure 6). It can be stated that Algeria (0.759) and Egypt (0.700), which have the highest HDI indicator, sent only 3 and 6 students to Hungary, so there is no significant correlation between the value of the HDI indicator and the number of students sent for this type of scholarship. Figure 6 shows, however, that a really strong positive correlation (r = 0.92) can be established between HDI and GDP per capita, which is not surprising since GDP is one of the dimensions of HDI.

Studying countries providing the most FAO students, there is no significant correlation between the MPI index and the willingness to move, as Ethiopia, where the largest number of students arrived in Hungary in the last 12 years, has a remarkably high poverty rate of 0.489, while this indicator is exceptionally low for Kenya (0.178) and Ghana (0.138). It can be stated that where the MPI index is high, the fewest students came to Hungary: South Sudan, Burkina Faso, Chad. Figure 7 shows that there is a moderately strong negative correlation (r = 0.72) between MPI and GDP per capita. The higher the GDP is, the lower value of the poverty index is indicated.

This study argues that it is important to study students and their mobility in the global knowledge society as they play a central role in growth, development and overall progress. The present study uses macroeconomic indicators to demonstrate that in African countries where the poverty rate is high, the human development rate is lower. For the 16 African countries examined, it can also be stated that the higher the GDP per capita is, the lower value of the poverty index can be measured, and the calculations prove that a really strong positive correlation can be established between HDI and GDP per capita.

Analysing a further correlation with the macroeconomic indicators mentioned earlier in the present study, it can be concluded that where the MPI index is low, the value of the HDI index is high and vice versa, a high MPI index is coupled with a lower HDI. Thus, it can be clearly stated that where the value of the poverty index is high, the numerical value of the human development indicator is lower (Figure 8).

In general, restoring macroeconomic stability and institutional confidence is a short-term priority for reviving competitiveness and growth in Africa. In the long run, reducing productivity disparities will require continued investment in infrastructure, human capital and technological development.

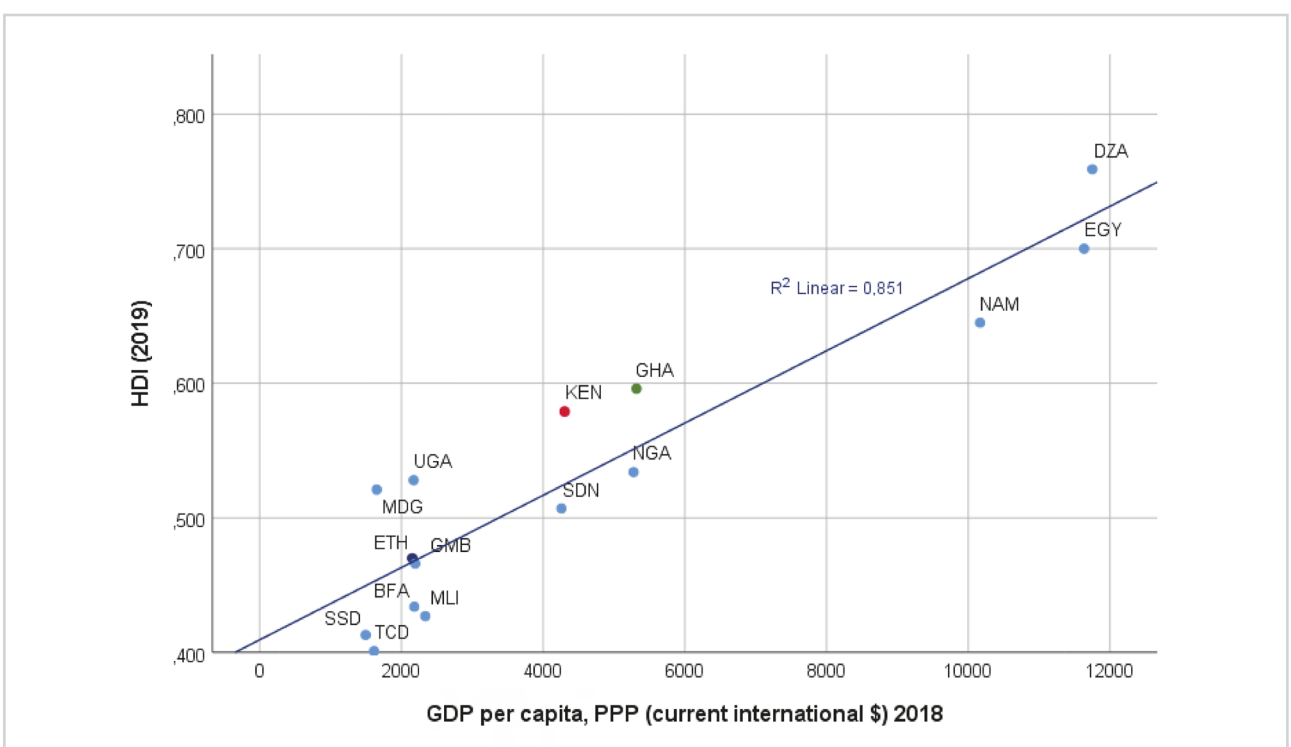

Figure 6:
Correlation between HDI index and GDP per capita of the studied countries
Source: The World Bank Data (2020)

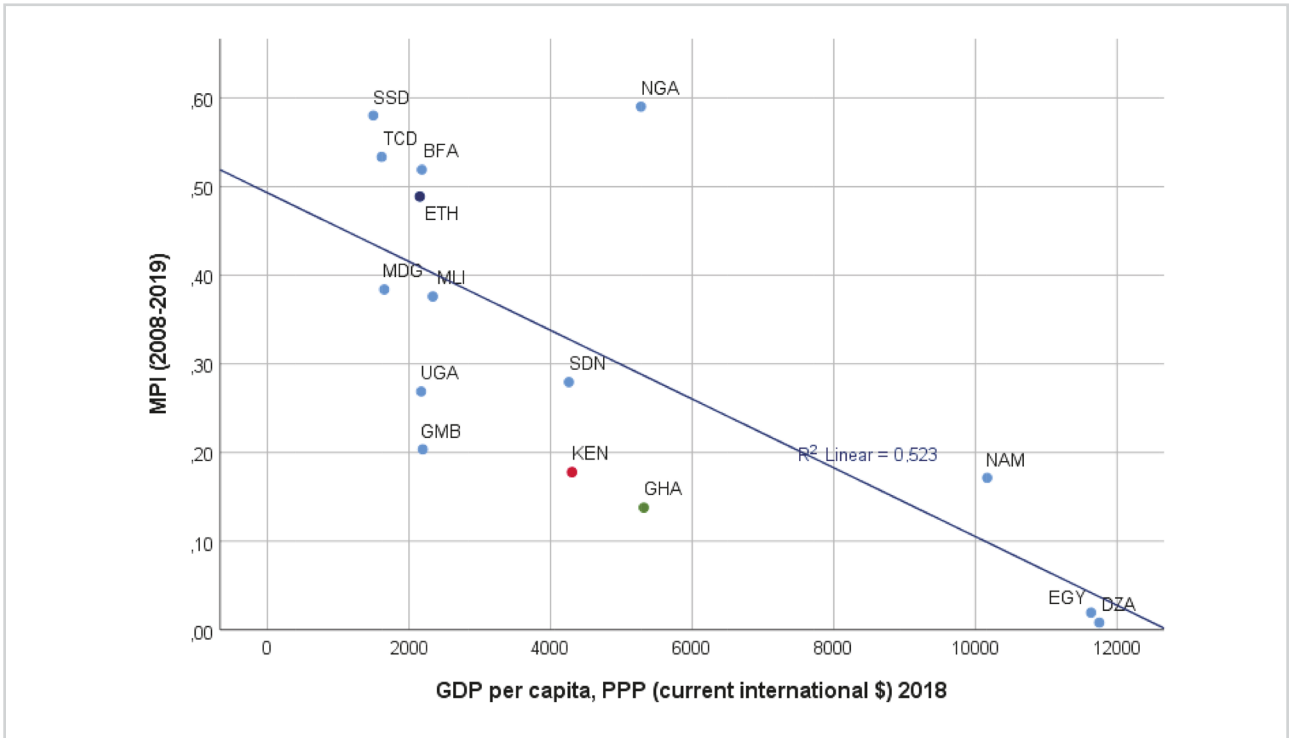

Figure 7:
Correlation between the MPI index and GDP per capita of the studied countries
Source: The World Bank Data (2020)

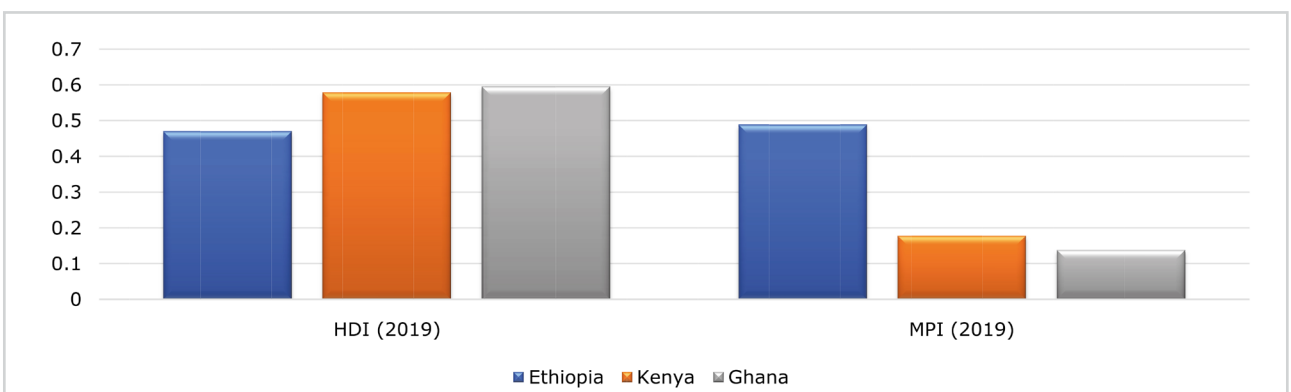

Figure 8:
Indicators examined in countries that send the most FAO students
Source: Own elaboration

5. Conclusions

The relevance and significance of this research can be realized from the fact that migration of higher education students is a highly valuable and diverse research topic that can be analysed from the perspectives of both host and sending countries. Since long, migration of higher education students has remained an essential issue of discussions, as it includes several thematic-related key issues that can be analysed from various perspectives of higher education institutions and policies, globalisation, creation and transfer of knowledge, development, demographic, economic, political, social, and cultural concerns in both sending and host countries.

Various indicators are also used to compare the development of countries. Today, it is no longer possible to evaluate a country's results and development with a single indicator, only in terms of GDP growth, because although the indicator is excellent for measuring economic output, it has significant shortcomings in terms of indicating general well-being. The most respected economists around the world are working to develop new indicators that better reflect the state of society, nation and economy as a whole in the 21st century and are suitable for comparing change and making reliable analyses.

Contribution of the theory is that with using various indicators it can be stated that in the examined African countries MPI index and HDI index are inversely proportional. Thus, it can be clearly stated that where the value of the poverty index is high, the numerical value of the human development indicator is lower. Most FAO students are from the following three countries: Ethiopia, Kenya, and Ghana. Chad (TCD) has the highest share of employment in the agricultural sector, while the contribution of agriculture to GDP is also high. It can be stated that there is no significant correlation between the value of the HDI indicator and the number of students sent for this type of scholarship. There is a really strong positive correlation between HDI and GDP per capita. For the 16 African countries examined, it can also be declared that the higher the GDP per capita is, the lower value of the poverty index can be measured, and the calculations prove that a really strong positive correlation can be established between HDI and GDP per capita. It is to be mentioned that where the MPI index is high, the fewest students came to Hungary. The higher the GDP is, the lower value of the poverty index is indicated.

The growing importance of migration of higher education students in sending countries is in line with the growing recognition of the potential benefits of returning migrant students who complete their mobility and with their potential contribution to knowledge transfer, brain growth, skills acquisition, and economic development (Satti & Nour, 2020; Oliinyk et al., 2021).

In the long run, as host countries from the developed world receive more international students and attract global talents, «centre versus periphery» relationships could also emerge in the process of knowledge production and dissemination between developed and developing nations. As higher education institutions from the developed world (the centre) attract more talented students and manage to retain them contributing to the knowledge production and distribution in the host countries, institutions from developing countries, (the periphery) would assume a dependent position relying on technologies, knowledge, goods and services produced by the centre. Countries with highly advanced infrastructure, attractive salaries, and advanced research facilities have strong competitive advantage to attract talented international students who bring along international experiences and contribute to the development of knowledge economy in the host countries. African universities in this regard are the most vulnerable institutions due to their weak financial and infrastructural settings that contribute to their marginalization in knowledge production and dissemination processes. Thus, unless African higher education institutions develop their capacity to attract and retain both African and international students, international student mobility might lead to the overwhelming impact of brain drain in the continent. As Dr. Lalla Ben Barka, Deputy Executive Secretary ECA, states, «African governments have a great responsibility to ensure that brains remain in the continent; otherwise, in 25 years' time, Africa will be empty of brains» (cit. in Chawawa, 2013).

Future directions of the research are whether there is a correlation between the value of non-financial indicators in each sending country and the willingness and probability to move, henceforward examining these factors in different scholarship opportunities such as ERASMUS+ or any other, for instance, governmental scholarships.

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