

# GDP STRUCTURE AND ECONOMIC PERFORMANCE IN SUB-SAHARAN COUNTRIES

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## Abstract

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Africa belongs to important regions of the world economy with specific problems distinguishing this part of the world from other regions. The region is suffering because of limited economy structure and high level of poverty. Low economic performance ranks most of African countries among the worldwide poorest ones (both from the point of view of total economy performance and also individuals living standards); the development is hindered by political instability and also by other accompanied problems as high level of corruption, deficit of democracy, low level of education, limited investments, criminality, local conflicts, civil wars etc. On the other hand, African natural, economy and social resources and unexploited opportunities in many areas offer a potential for a considerable economic development. Understanding the current economic position of African states thus may reveal causes of problematic development and outline ways to overcome existing shortcomings. The aim of the paper is to analyze main changes in area of GDP structure formation (agricultural, industrial and services sector share in GDP and value performance) which have occurred in selected African (Sub-Saharan) countries. Changes are analyzed both in relation to the total GDP and GDP per capita. The authors identify main trends of economic development in the Sub-Saharan region and to specify differences among Sub-Saharan countries with the intention to identify particular groups of African countries according to their economic structure and to identify differences in their GDP formation.

Keywords: Africa, gross domestic product, structure, value, relationship, sensitivity, services, industry, agriculture

## INTRODUCTION

Africa is one of the most specific regions within the world economy (Its history, economy, social and cultural structure and development are influenced by long term colonization, regional instability and local and international policy. Structure of economy and population are completely different in relation to other regions around the world. The problem of Africa is high inter-annual population growth rate, post-colonial economy structure, limited economy performance, low level of intra-regional cooperation and low level of economy and social infrastructure) (Jenicek, 2010a). More than one billion people living in Africa represent more than 15% of the total world population (WDI database, 2014). However its share in the global economy is about 2–3%. Sub-

Sahara is the most specific area in the continent. The population of this part of Africa reaches about 900 million which represents 12.7% of the total world population, but its share in the global economy (in terms of GDP) is less than 1.7%. Africa and especially the Sub-Saharan part experienced very specific and also very dynamic economic development the last two decades (Thies, 2007; Ahmed and Suardit, 2007; Ndulu, 2006).

The world economy changed significantly in the period after the end of the cold war (Ajakaiye, Ncube and Macakiage, 2007). Barriers of the economic development which existed between the western and eastern blocks have been removed; the following development affected not only countries directly involved into the west-east competition, but a significant effect was experienced in the case of those countries which

were formerly satellites of the antagonistic blocks or which were providing their policies on the edge between both competing groups (The end of "Cold war" influenced African countries significantly. During the "Cold war" period individual countries were supported by western or eastern blocks of countries. Their economies were subsidized by both competing groups of countries. Some African countries decided to take part in western block, some of them decided to take part in eastern block. However the majority of them were balancing between the both competing groups of countries. The competition had positive and also negative impacts on individual countries. The positive impact was the flow of investments and subsidies from individual competitors; on the other hand the negative impact was the political, social and security instability of the region. Individual competing super powers were fighting for the control over the African region and the result of that competition instability and even war in many countries (Ethiopia, Somalia etc.). At the beginning of the 90s, African and especially Sub-Saharan countries opened a new chapter of their economic development. During the last two decades (1990–2011), the countries transformed their economies and the structure of their GDP formation changed significantly. African countries experienced a rapid GDP value growth in the service (cc 3.8% a year) and industrial sectors (cc 5.4% a year), on the other hand, a decreasing share of agriculture and mining sectors (cc -0.25 a year). Another important factor influencing the economic development in Sub-Saharan countries is a growth of foreign trade by individual countries (Johnson, 2005; Busmann, Schneider and Wiesehomeier, 2005). Sub-Saharan countries have become more involved into the world trade activities (Anderson, Martin and van der Mensbrugghe, 2004). Unfortunately, territorial and commodity structure is still not developed enough (Kirkpatrick, Watanabe, 2005). In such case, a persisting problem of all African countries, including Sub-Saharan states, is the intra-regional trade (Kirkpatrick and Watanabe, 2005; Tekle, Kameyama and Ito, 2008). Despite of many agreements signed among African countries, their mutual trade remains at a very low level. Intra-regional trade thus represents only about 10% of the Sub-Saharan total foreign trade. African countries are more dependent on trade with Europe and Asia than on trade within the region. Such situation is very specific if compared to other regions, e.g. Europe (about 70% of foreign trade operations are performed within Europe), Asia (50%) and America (over 50%).

The paper aims to analyze main changes which have occurred in the GDP formation and structure in selected Sub-Saharan countries; changes are analyzed both in relation to total value and on a per capita basis. The idea is to identify main development trends of the Sub-Saharan region and differences among individual Sub-Saharan countries with

the aim to determine particular groups of African countries according to their economic structure. From this reason, the paper divides analyzed countries into four groups according to the structure of their GDP formation: agriculture, services, industry (ASI); industry, services, agriculture (ISA); services, industry, agriculture (SIA); and services, agriculture, industry (SAI). The mentioned typology (Holub, 1970) provides a very simple, but realistic overview of problems of Sub-Saharan economy formation. Typology is able to provide an overview of differences existing in area of economy structure formation not only at the level of individual African countries, but it also enable to compare the results with other countries and region of the World.

According to Holub, there exist three historical stages of economic development: traditional (where the main economic driver is agriculture), transitional (with main economic driver of industry) and modern economy (the main economic driver is the sector of services). In general, Holub's methodology divides economies into six following groups according to the structure of their GDP formation: ASI (agriculture, industry, services); AIS (agriculture, services, industry); IAS (industry, agriculture, services); ISA (industry, services, agriculture); SAI (services, agriculture, industry); SIA (services, industry, agriculture). Traditional development of economic structure for majority of countries can be described as follows: ASI – AIS – IAS – ISA – SIA. In initial stages, the main share of the GDP is represented by agriculture, only small share by services or industry. However, most of countries have experienced a structural short cut as the relative decline in agriculture is accompanied by a great increase in the service sector than in industry. In such structural type (which is common for the majority of countries all over the world), the structural transformation goes through the stage of ASI to SAI and latter directly to that of SIA. The above mentioned theory gives a basis for analyzing structural development of the GDP formation in Sub-Saharan countries and for finding differences among analyzed countries in relation to their GDP structure and formation.

Talking about the economy transformation – it is necessary to highlight the fact that the transformation is necessary for the future development of any country around the world. The potential of primary sector to generate the sufficient number of job opportunities and economy performance is limited. Primary sectors' ability to generate sufficient added value is also very limited. The similar situation is existing also in the case of industry sector. The progress in area of new technologies is reducing the number of labor force necessary for that sector of economy. To provide the sufficient number of job opportunities and also to generate sufficient level of added value – it is necessary to support the growth of services sector – both private and public services. Transformation of economy is the only solution of current society problems – especially in Sub-

I: *Intra- and inter-regional merchandise trade, 2012*

| (Billion dollars and percentage)   |               | Destination               |              |              |              |              |              |              |
|--|---------------|---------------------------|--------------|--------------|--------------|--------------|--------------|--------------|
| Origin   | North America | South and Central America | Europe       | CIS          | Africa       | Middle East  | Asia         | World        |
| <b>Value</b>   |               |                           |              |              |              |              |              |              |
| <b>World</b>   | <b>3035</b>   | <b>787</b>                | <b>6564</b>  | <b>550</b>   | <b>580</b>   | <b>714</b>   | <b>5333</b>  | <b>17930</b> |
| North America  | 1151          | 217                       | 380          | 18           | 38           | 75           | 488          | 2371         |
| South and Central America  | 187           | 202                       | 128          | 8            | 21           | 17           | 172          | 750          |
| Europe   | 492           | 124                       | 4383         | 245          | 211          | 208          | 643          | 6385         |
| Commonwealth of Independent States (CIS)   | 37            | 7                         | 430          | 149          | 14           | 20           | 127          | 805          |
| Africa   | 74            | 30                        | 240          | 2            | 81           | 17           | 160          | 630          |
| Middle East  | 118           | 11                        | 148          | 7            | 39           | 116          | 732          | 1349         |
| Asia   | 975           | 196                       | 855          | 121          | 177          | 260          | 3012         | 5640         |
| <b>Share of regional trade flows in each region's total merchandise exports</b>  |               |                           |              |              |              |              |              |              |
| <b>World</b>   | <b>16.9</b>   | <b>4.4</b>                | <b>36.6</b>  | <b>3.1</b>   | <b>3.2</b>   | <b>4.0</b>   | <b>29.7</b>  | <b>100.0</b> |
| North America  | 48.6          | 9.1                       | 16.0         | 0.8          | 1.6          | 3.2          | 20.6         | 100.0        |
| South and Central America  | 24.9          | 26.9                      | 17.0         | 1.1          | 2.8          | 2.3          | 23.0         | 100.0        |
| Europe   | 7.7           | 1.9                       | 68.6         | 3.8          | 3.3          | 3.3          | 10.1         | 100.0        |
| Commonwealth of Independent States (CIS)   | 4.6           | 0.9                       | 53.4         | 18.5         | 1.7          | 2.5          | 15.7         | 100.0        |
| Africa   | 11.7          | 4.8                       | 38.2         | 0.3          | 12.8         | 2.7          | 25.3         | 100.0        |
| Middle East  | 8.7           | 0.8                       | 11.0         | 0.5          | 2.9          | 8.6          | 54.2         | 100.0        |
| Asia   | 17.3          | 3.5                       | 15.2         | 2.1          | 3.1          | 4.6          | 53.4         | 100.0        |
| <b>Share of each region's exports in world merchandise exports to the region</b> |               |                           |              |              |              |              |              |              |
| <b>World</b>   | <b>100.0</b>  | <b>100.0</b>              | <b>100.0</b> | <b>100.0</b> | <b>100.0</b> | <b>100.0</b> | <b>100.0</b> | <b>100.0</b> |
| North America  | 37.9          | 27.6                      | 5.8          | 3.3          | 6.5          | 10.5         | 9.2          | 13.2         |
| South and Central America  | 6.2           | 25.6                      | 1.9          | 1.5          | 3.6          | 2.4          | 3.2          | 4.2          |
| Europe   | 16.2          | 15.7                      | 66.8         | 44.6         | 36.3         | 29.2         | 12.0         | 35.6         |
| Commonwealth of Independent States (CIS)   | 1.2           | 0.9                       | 6.6          | 27.0         | 2.4          | 2.8          | 2.4          | 4.5          |
| Africa   | 2.4           | 3.9                       | 3.7          | 0.3          | 13.9         | 2.4          | 3.0          | 3.5          |
| Middle East  | 3.9           | 1.4                       | 2.3          | 1.3          | 6.8          | 16.2         | 13.7         | 7.5          |
| Asia   | 32.1          | 24.9                      | 13.0         | 21.9         | 30.4         | 36.5         | 56.5         | 31.5         |

Source: WTO, 2013

Saharan Africa. Sub-Saharan Africa is the only region where the process of economy transformation is running slowly. Without economy restructuring – Africa is not able to improve its current situation and to get better position within the world economy and society.

## MATERIALS AND METHODS

The paper analyzes GDP of African countries, its structure and development, covering the period 1990–2011 (The mentioned time series cover the period of African and World economy transformation. After the end of “Cold war” – since the beginning of nineties – African countries opened the new chapter of their economy and society development. The selected time period is analyzing the whole last two decades transformation period. Unfortunately data for period 2012 and 2013 are

not included into the analyses. The reason is bad data available for majority of countries.). The GDP is expressed in USD, both in current and constant prices (2005). Main data sources have been provided by the World Bank (WDI database). The WDI database (available at: <http://databank.worldbank.org/data/views/variableSelection/selectvariables.aspx?source=world-development-indicators>) provides overview of individual African countries economy development (available data cover the whole analyzed time period). The analysis is focused especially on the Sub-Saharan region which consists of about fifty countries at different stages of their economic development. Because of limited data availability, there were selected following countries located in sub-Sahara and North Africa: Algeria, Angola, Benin, Botswana, Burkina Faso, Burundi, Cameroon, Comoros, Democratic

Republic of Congo, Republic of Congo, Cote d'Ivoire, Egypt, Eritrea, Ethiopia, The Gambia, Ghana, Guinea, Chad, Kenya, Lesotho, Madagascar, Malawi, Mali, Mauretania, Mauritius, Morocco, Mozambique, Namibia, Rwanda, Senegal, Seychelles, Sierra Leone, South Africa, Sudan, Swaziland, Tanzania, Togo, Tunisia, Uganda, Zambia and Zimbabwe.

The GDP value and structure of selected countries has been analyzed from three different perspectives: agricultural, industrial and services sector' value development. The mutual relationship between the total GDP and its particular components has been analyzed using the methods of correlation and elasticity. The analysis of elasticity is based on logarithmic regression (The only ambition of that regression is to calculate the functional elasticity existing between total GDP or total GDP/cap on one side and agricultural, industrial and services sectors' GDP respectively GDP/cap on the other side. Functional elasticity is calculated for Sub-Saharan Africa and World as groups of countries (total GDP = f (Agricultural, Industry and Services GDP; total GDP/cap = f (Agricultural, Industry and Services GDP/cap). For individual countries the elasticity analysis is calculated as a simple elasticity (total GDP = f (Agricultural GDP); total GDP = f (Industry GDP); total GDP = f (Services GDP).) to investigate mutual relationship between the GDP and its components (agriculture, industry and services). Correlation analyses is conducted between GDP or GDP/cap on one side and individual variables (Agricultural GDP respectively GDP/cap; Industry GDP respectively GDP/cap; Services GDP respectively GDP/cap). All calculations are conducted in Microsoft Office Excel 2010. The aim of the analysis is to identify differences existing in area of sensitivity of the total

GDP in selected countries to changes in its particular components.

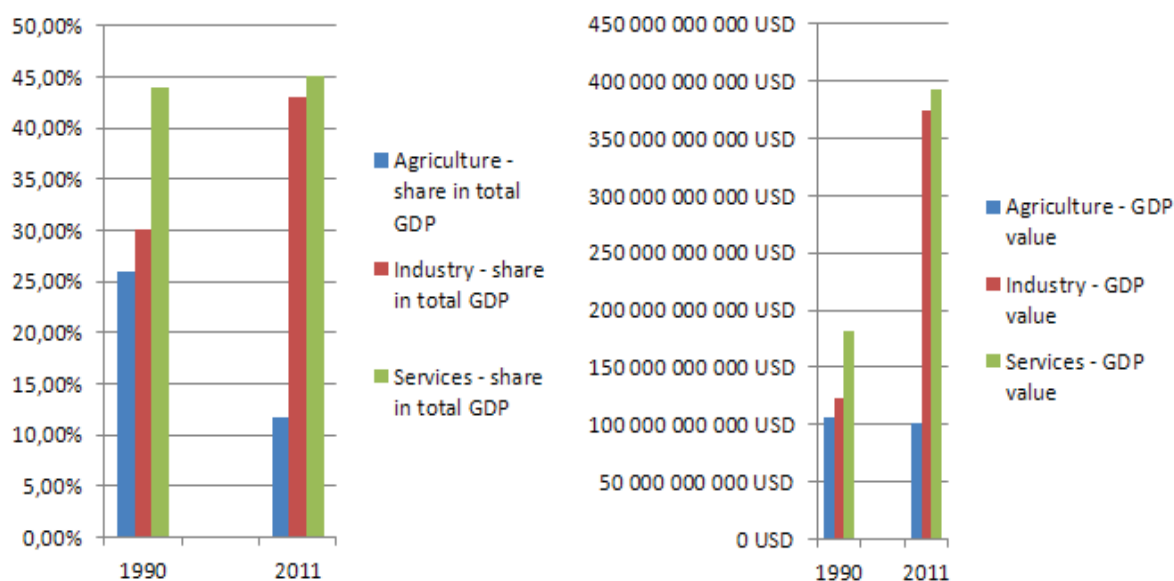
A special part of the paper is focused on the GDP analysis at a per capita level. The aim of provided analysis consists in determining the GDP per capita development and comparing the developmental relationships of the total GDP and GDP per capita in selected countries. The objective of this analysis is to highlight one of the main problems of African economy development. However its total GDP value performance is growing very fast in comparison to other regions around the world – the majority of that growth is not reflected into individuals' living standards growth, but it is absorbed or even eliminated by the significant population growth. The GDP per capita is analyzed on the same methodological basis used for the GDP as a total.

## RESULTS AND DISCUSSION

During the last two decades, the global economy experienced significant growth of the GDP. The world GDP has increased its value from 22 trillion USD to about 70 trillion USD during the period 1990–2011 (Tab. II). The share of particular sectors in the total world GDP has changed subsequently (agriculture: from 5.14% to 4.21%, industry: from 37.50% to 38.68% and services: from 57.35% to 57.11%).

Taking into account the Sub-Saharan countries, their GDP has increased from about 300 billion USD to almost 1.3 trillion USD during the reference period; presented in constant prices, the growth has jumped from 411 billion USD to about 868 billion USD.

Analyzing the composition of the GDP in Sub-Saharan countries, following changes can be observed: the share of agriculture in the total



1: The structure and value development of GDP in Sub-Saharan countries 1990 vs. 2011

Source: WDI database and own processing, 2014

GDP was significantly reduced from 25.95% to 11.77%; on the other hand, the share of industry increased from about 30% to 43% and the share of service sector in the total regional GDP remained approximately at the same level (43.93% in 1990 and 45.18% in 2011). For details related to GDP structure and value development in analyzed time period – see Fig. 1.

Comparing Sub-Saharan economic development and development of the world economy, much more dynamic growth in Sub-Saharan economy can be observed. African economy is growing much faster especially in industrial and service sectors. Despite of dynamic growth in the agricultural sector, its share in the economy is decreasing; on the other hand, the share of services and especially industry in the total GDP is becoming more and more important. It is useful to highlight much higher dynamics of industrial value added in comparison with the service sector. While the service sector has been the leader of the world's economic growth during the last two decades, in Africa, it was the sector of industry. It is worth recalling the specific GDP composition in many Sub-Saharan

countries. While almost 60% of the world GDP is represented by service sector, it is less than a half in Sub-Saharan Africa. Sub-Saharan economies thus stand in contrast to developed countries, where the share of services in the total GDP ranges usually from 70 to 90%. In relation to Africa it is necessary to highlight one very specific feature of GDP structure and value development. Both industrial and services sector's GDP value is growing very fast. In this specific case the value of industrial sector's GDP is growing even much faster than it is typical for the rest of the world.

One very important finding related to Sub-Saharan countries economy development is related to differences existing between GDP value development in current and constant prices. Usually – if any data related to African economy development is presented the growth of economy is amazing, however the real growth lower by fifty percent. On the other hand the similar situation is existing also in other regions. If we compare African GDP both in current and constant prices – its average inter-annual growth rate is twice higher than the world average.

## II: The world and Sub-Saharan GDP value and structure (1990–2011)

|   |                             | 1990<br>bn USD | 2011<br>bn USD | Basic index | Chain index –<br>geomean |
|---|-----------------------------|----------------|----------------|-------------|--------------------------|
| World<br>Constant 2005 UDS              | GDP                         | 30,291         | 52,507         | 1.73        | 1.027                    |
|   | Agriculture, value added    | 1,557          | 2,210          | 1.42        | 1.017                    |
|   | Industry, value added       | 11,363         | 20,311         | 1.79        | 1.028                    |
|   | Services, etc., value added | 17,371         | 29,987         | 1.73        | 1.026                    |
| World<br>Current USD                    | GDP                         | 22,001         | 70,371         | 3.20        | 1.057                    |
|   | Agriculture, value added    | 1,131          | 2,961          | 2.62        | 1.047                    |
|   | Industry, value added       | 8,253          | 27,221         | 3.30        | 1.058                    |
|   | Services, etc., value added | 12,617         | 40,189         | 3.19        | 1.057                    |
| Sub-Saharan Africa<br>Constant 2005 UDS | GDP                         | 412            | 868            | 2.11        | 1.036                    |
|   | Agriculture, value added    | 107            | 102            | 0.96        | 0.998                    |
|   | Industry, value added       | 124            | 374            | 3.01        | 1.054                    |
|   | Services, etc., value added | 181            | 392            | 2.17        | 1.038                    |
| Sub-Saharan Africa<br>Current USD       | GDP                         | 300            | 1,278          | 4.25        | 1.071                    |
|   | Agriculture, value added    | 78             | 150            | 1.93        | 1.032                    |
|   | Industry, value added       | 90             | 550            | 6.08        | 1.090                    |
|   | Services, etc., value added | 132            | 577            | 4.37        | 1.073                    |

Source: WDI database and own calculations, 2013

## III: The share of economic sectors in the total GDP (World and Sub-Saharan Africa)

|   | Share in total GDP          | 1990   | 2011   |
|---|-----------------------------|--------|--------|
| World constant USD                                  | Agriculture, value added    | 5.14%  | 4.21%  |
|   | Industry, value added       | 37.51% | 38.68% |
|   | Services, etc., value added | 57.35% | 57.11% |
| Sub-Saharan Africa (all income levels) constant USD | Agriculture, value added    | 25.95% | 11.77% |
|   | Industry, value added       | 30.12% | 43.05% |
|   | Services, etc., value added | 43.93% | 45.18% |

Source: WDI database and own calculations, 2013



The figures presented in the Tab. III show that the economic development in Sub-Saharan Africa has led to increased share of industry in the total GDP at expense of agriculture in the period 1990–2011, just small differences have occurred in the share of service sector. It indicates that a typical economic composition based on SIA model is not reached in many Sub-Saharan countries, mainly due to their transition processes. For more information see the details of the GDP composition in the world and Sub-Saharan Africa presented in the Tab. III.

Basic information about composition of selected Sub-Saharan economies is presented in the Tab. IV (compare with data in Tabs. X and XI).

Data in the Tab. IV can give an illustration that Sub-Saharan Africa is represented by four basic types of economies based on their GDP structure. The most important type of the GDP formation is represented by the SIA model (17 from total 37 surveyed countries). Economies characterized by the SAI model and the ISA model have been found out in case of 8 countries. The last type, represented by ASI model, is a model of 4 surveyed economies. If analyzing Sub-Saharan Africa as the whole, the SIA model will result; nevertheless, comparing Sub-Saharan region with the world economy, two significantly different SIA models (concerning their composition) will be found out. While the share of agriculture in the world's GDP is about 4%, it is about 12% in sub-Sahara. Sub-Saharan Africa has higher proportion of industry in relation to the total GDP (43%) than the world economy (38%). Much lower importance has the services sector in sub-Sahara (45%), compared to the average of the world (57%).

During the analyzed time period, Sub-Saharan region reached an annual growth rate at about 3.6%, while the world economy about 2.7%. Comparing basic trends of African and world GDP, the biggest difference is not appearing in relation to the GDP as total, but especially in relation to the GDP at a per capita basis. While the world GDP per capita reached an annual growth of 1.3%, it was only 0.9% in Sub-Saharan Africa (For details about world and Sub-Saharan Africa, see Tabs. VI and VII. For detail about individual analyzed countries – see Tabs. X and XI). The reason for such development can be explained by very dynamic population growth in Africa (During the analyzed time period Africa recorded the population growth from 485 mil. people to 854 mil. people), which is much higher in comparison with the rest of the world (world population increased from 5.3 bn. people to 6.99 bn. people). To see differences between GDP and GDP/cap inter annual growth rate in individual countries – see Fig. 2.

To understand economic development in Sub-Saharan Africa, it is necessary to take in consideration the fact that the region experienced significant changes not only with respect to its economic development as a whole, but especially with respect to development of its economic

structure during the last two decades. While the cumulative percentage changes in the GDP structure have reached only 2.34% in the world economy, it has been over 28% in Sub-Saharan Africa. The share of the agricultural GDP in the total GDP has changed its value by 0.93% in the world; in Africa, this change has reached 14.2%. Similar disproportion can be found out also in relation to the share of industry (1.17% vs. 12.93%) and services (0.24% vs. 1.25%) in the total GDP. Above mentioned results make evident that the sub-African economy is changing very fast (Fig. 2). Despite of the fact that the region and its countries have reached such economic structure, which is in general comparable to economic structure of the world and developed countries, the current state of African economy is still far from the modern standards and the process of economic transformation (African region is following transformation processes running in world economy. But the structure of African economy is still not ideal. While the world economy is heavily dominated by services, in Africa the share of services sector is still very low and on the other hand the share of industrial sector – especially mining activities – is very high.) has not been finished yet (for details see Tabs. X and XI). All surveyed countries experienced much bigger changes in their GDP structure than what is typical for the world economy. There are also very significant differences within African countries. The Republic of Congo, for example, experienced significant change in its GDP structure (share of agriculture in the total GDP has changed by 10%; the shares of industry and services have changed by 36% respectively 27%). On the other hand, Kenya reached only limited change in its GDP structure (for details, see the Tab. V). Particular areas and countries in Sub-Saharan Africa are in different stages of their economic development. While some of them have already fully transformed their economy, many others have not yet finished their process of transformation. As fully transformed economies (economies reached SIA model state and individual sectors' shares are similar to world average) we can consider countries in Northern Africa; focusing on the Sub-Saharan part, following countries may be considered as transformed: Seychelles, Eritrea, the Gambia, Mauritius, Chad, South Africa, Namibia, Senegal and Lesotho. The other countries are still being in different stages of transformation, despite of the fact that their economies have already reached the SIA or SAI model structure (Usually the share of services sector is much lower than it is typical for world economy or developed countries and on the other hand the share of industry in total GDP value is too high (especially in relation to mining activities)). Many countries still did not reach an appropriate level of services in their total GDP and their share of agricultural sector in the GDP structure remains enormous high (Ethiopia, Sierra Leone, Congo,

## IV: Development of the GDP structure in Sub-Saharan countries (period 1990–2011)

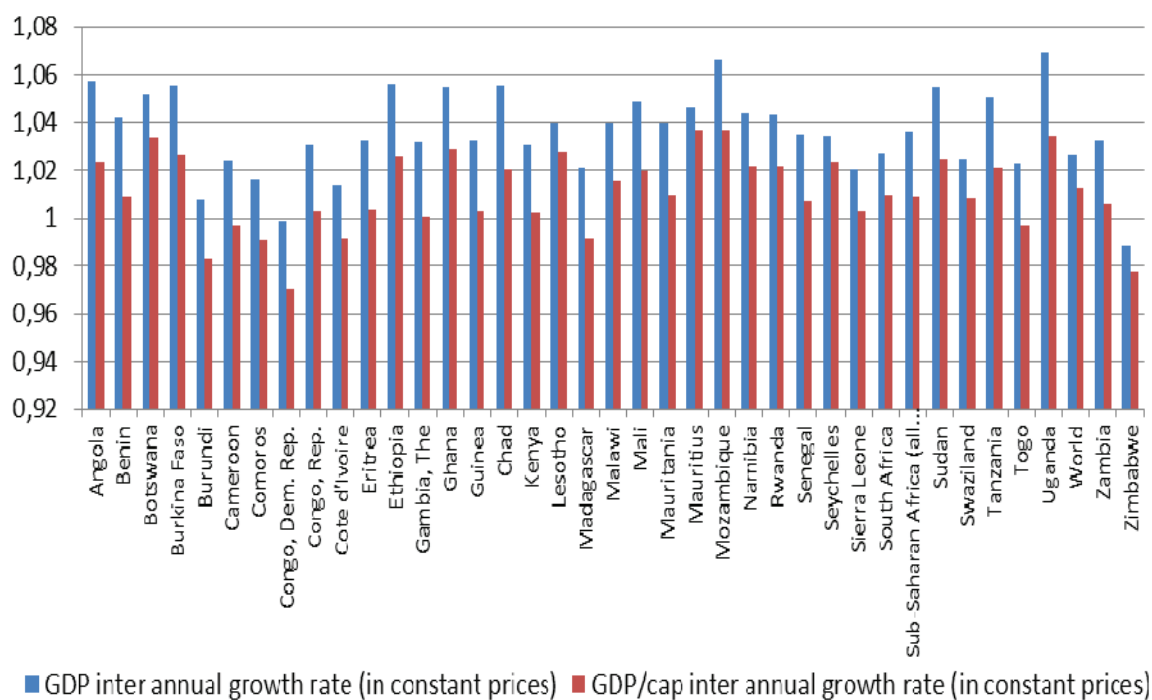
| 1990                         | Agriculture | Industry | Services | 2011                          | Agriculture | Industry | Services | Differences |          |          |
|------------------------------|-------------|----------|----------|-------------------------------|-------------|----------|----------|-------------|----------|----------|
| SIA 2011                     |             |          |          | Agriculture Industry Services |             |          |          | Agriculture | Industry | Services |
| Seychelles                   | 5%          | 16%      | 79%      | Seychelles                    | 2%          | 14%      | 84%      | -2.57%      | -2.66%   | 5.24%    |
| Eritrea                      | 27%         | 21%      | 51%      | Eritrea                       | 10%         | 19%      | 71%      | -17.30%     | -1.81%   | 19.11%   |
| Gambia                       | 24%         | 11%      | 65%      | Gambia                        | 19%         | 13%      | 68%      | -5.46%      | 2.45%    | 3.00%    |
| Mauritius                    | 11%         | 43%      | 46%      | Mauritius                     | 3%          | 34%      | 62%      | -7.72%      | -8.58%   | 16.31%   |
| Chad                         | 28%         | 22%      | 50%      | Chad                          | 8%          | 30%      | 62%      | -20.39%     | 8.84%    | 11.55%   |
| South Africa                 | 4%          | 46%      | 50%      | South Africa                  | 2%          | 36%      | 61%      | -1.99%      | -9.22%   | 11.21%   |
| Namibia                      | 11%         | 44%      | 45%      | Namibia                       | 7%          | 36%      | 57%      | -3.29%      | -8.15%   | 11.44%   |
| Senegal                      | 18%         | 30%      | 52%      | Senegal                       | 13%         | 31%      | 56%      | -4.50%      | 1.01%    | 3.49%    |
| Madagascar                   | 26%         | 20%      | 53%      | Madagascar                    | 23%         | 24%      | 53%      | -2.92%      | 3.51%    | -0.59%   |
| Lesotho                      | 22%         | 41%      | 37%      | Lesotho                       | 8%          | 41%      | 51%      | -14.29%     | -0.19%   | 14.48%   |
| Kenya                        | 25%         | 31%      | 44%      | Kenya                         | 25%         | 28%      | 47%      | -0.49%      | -2.42%   | 2.91%    |
| Uganda                       | 53%         | 16%      | 30%      | Uganda                        | 21%         | 32%      | 47%      | -31.81%     | 15.28%   | 16.53%   |
| Cameroon                     | 24%         | 31%      | 45%      | Cameroon                      | 15%         | 38%      | 47%      | -8.50%      | 6.42%    | 2.09%    |
| Sudan                        | 39%         | 19%      | 42%      | Sudan                         | 24%         | 30%      | 46%      | -15.33%     | 11.97%   | 3.36%    |
| Ghana                        | 45%         | 17%      | 38%      | Ghana                         | 24%         | 31%      | 45%      | -20.95%     | 13.53%   | 7.42%    |
| Zambia                       | 18%         | 57%      | 25%      | Zambia                        | 19%         | 38%      | 43%      | 1.16%       | -19.23%  | 18.07%   |
| Tanzania                     | 42%         | 25%      | 33%      | Tanzania                      | 25%         | 32%      | 43%      | -16.92%     | 7.34%    | 9.58%    |
| SAI 2011                     |             |          |          |                               |             |          |          |             |          |          |
| Togo                         | 34%         | 23%      | 44%      | Togo                          | 31%         | 16%      | 53%      | -2.41%      | -6.69%   | 9.10%    |
| Benin                        | 35%         | 12%      | 53%      | Benin                         | 29%         | 19%      | 52%      | -5.49%      | 6.37%    | -0.88%   |
| Rwanda                       | 33%         | 25%      | 43%      | Rwanda                        | 32%         | 16%      | 52%      | -0.49%      | -8.24%   | 8.74%    |
| Malawi                       | 38%         | 39%      | 22%      | Malawi                        | 27%         | 27%      | 46%      | -11.09%     | -12.42%  | 23.52%   |
| Comoros                      | 41%         | 8%       | 50%      | Comoros                       | 41%         | 14%      | 45%      | -0.80%      | 6.12%    | -5.32%   |
| Burundi                      | 51%         | 26%      | 23%      | Burundi                       | 32%         | 24%      | 44%      | -18.91%     | -1.63%   | 20.54%   |
| Burkina Faso                 | 28%         | 24%      | 48%      | Burkina Faso                  | 31%         | 30%      | 39%      | 3.16%       | 5.87%    | -9.03%   |
| ISA 2011                     |             |          |          |                               |             |          |          |             |          |          |
| Botswana                     | 5%          | 64%      | 32%      | Botswana                      | 3%          | 52%      | 46%      | -1.93%      | -11.98%  | 13.91%   |
| Mozambique                   | 34%         | 25%      | 41%      | Mozambique                    | 28%         | 29%      | 43%      | -6.04%      | 3.95%    | 2.09%    |
| Zimbabwe                     | 15%         | 40%      | 45%      | Zimbabwe                      | 13%         | 46%      | 40%      | -1.49%      | 6.48%    | -4.99%   |
| Swaziland                    | 9%          | 51%      | 40%      | Swaziland                     | 6%          | 59%      | 35%      | -3.04%      | 7.77%    | -4.73%   |
| Cote d'Ivoire                | 32%         | 23%      | 44%      | Cote d'Ivoire                 | 24%         | 43%      | 33%      | -8.20%      | 19.76%   | -11.55%  |
| Mauritania                   | 27%         | 36%      | 37%      | Mauritania                    | 14%         | 55%      | 31%      | -12.49%     | 18.57%   | -6.08%   |
| Guinea                       | 25%         | 31%      | 45%      | Guinea                        | 20%         | 49%      | 30%      | -4.42%      | 18.54%   | -14.12%  |
| Angola                       | 18%         | 41%      | 41%      | Angola                        | 9%          | 62%      | 29%      | -8.65%      | 21.28%   | -12.63%  |
| Congo, Rep.                  | 13%         | 41%      | 46%      | Congo, Rep.                   | 3%          | 77%      | 20%      | -9.48%      | 35.98%   | -26.50%  |
| ASI 2011                     |             |          |          |                               |             |          |          |             |          |          |
| Ethiopia                     | 52%         | 16%      | 33%      | Ethiopia                      | 43%         | 17%      | 40%      | -8.60%      | 1.44%    | 7.16%    |
| Mali                         | 44%         | 19%      | 37%      | Mali                          | 35%         | 30%      | 35%      | -9.06%      | 11.96%   | -2.90%   |
| Sierra Leone                 | 44%         | 24%      | 32%      | Sierra Leone                  | 55%         | 12%      | 34%      | 10.54%      | -12.44%  | 1.91%    |
| Congo, DR                    | 30%         | 31%      | 39%      | Congo, DR                     | 44%         | 25%      | 31%      | 13.48%      | -5.63%   | -7.85%   |
| World and Sub-Saharan Africa |             |          |          |                               |             |          |          |             |          |          |
| Sub-Sahara                   | 26%         | 30%      | 44%      | Sub-Sahara                    | 12%         | 43%      | 45%      | -14.18%     | 12.93%   | 1.25%    |
| World                        | 5%          | 38%      | 57%      | World                         | 4%          | 39%      | 57%      | -0.93%      | 1.17%    | -0.24%   |

Source: WDI database and own calculations, 2013

Mozambique, Comoros, Burundi, Burkina Faso, Rwanda, Togo, Benin etc.).

Tabs. VI and VII provide information about the GDP formation in Sub-Saharan Africa and in the world. Differences are apparent not

only in relation to annual growth (both to the total and per capita GDP growth), but they also exist in the GDP sensitivity and correlation in relation to changes in its individual components (agriculture, industry and services).



■ GDP inter annual growth rate (in constant prices) ■ GDP/cap inter annual growth rate (in constant prices)

2: Inter-annual growth rate of GDP and GDP/cap in individual analyzed countries (chain indices geo-mean)

Source: WDI database and own processing, 2014

High level of correlation is apparent in relation of the total Sub-Saharan GDP and the GDP generated by industry and services. On the other hand, very low correlation can be observed in mutual relation of the total and agricultural GDP; expressed on per capita basis, it is even negative (These results confirm the reduction of agricultural sector's importance for individual Sub-Saharan economies. Agricultural sector already lost the role of African economy driver and the reduction of agricultural sector is the result of services and industrial sector growth. Reduction of agriculture sector provides a possibility to distribute available labor forces into other economy sectors. Those sectors' ability to generate added value is much higher, than it is in the case of agricultural sector. On the other hand – if industrial and services sectors suffer, available free labor forces are looking for alternative working possibilities and they are coming back to the agricultural sector. This is probably the reason of negative relationship existing between total African GDP value and agricultural GDP value development). The sensitivity of the total Sub-Saharan GDP on changes in its individual components differs in comparison with the rest of the world. Differences are evident especially in relation to agriculture. African GDP is more sensitive to changes in agricultural sector. Contrary, the sensitivity of the GDP to changes in industry is almost the same both in Sub-Sahara and the other world regions. There is only little dependence of African GDP on changes in the service sector compared to the world economy. It can be stated that primary and secondary sectors play much

more important role in generating a total GDP in Africa than it is typical in the rest of the world, especially in developed countries. Analyzing individual Sub-Saharan countries, their sector sensitivity and correlation in relation to the total GDP, following results will be obtained (for details see Tab. VII).

The results indicate that the most sensitive economies in relation to agricultural sector are following countries: Ethiopia, Sierra, Leone, Burundi, Comoros, Congo D.R., Uganda, Rwanda, Tanzania, Mali, Togo, Ghana, Sudan, Benin, Burkina Faso and Malawi. High level of the GDP sensitivity to industry has been proved in the case of Botswana, Algeria, Angola, Swaziland, Congo, Lesotho, South Africa, Guinea, Tunisia, Zambia, Mauretania, Namibia, Zimbabwe, Egypt, Chad and Cameroon (both above the world and Sub-Saharan average). High sensitivity of the total GDP to service sector has been observed among following countries: Seychelles, The Gambia (over the world average), and further Eritrea, Uganda, Mauritius, Madagascar, South Africa, Senegal, Namibia, Congo and Benin (over the Sub-Saharan average).

The analysis has proved in general that Sub-Saharan countries are characterized by higher level of sensitivity of the total GDP to agricultural GDP than it is typical for the world economy. Nevertheless, it should be emphasized, the GDP of Sub-Saharan countries is characterized by much lower level of correlation to agricultural GDP (in comparison with the world economy). Mutual relationship between the total GDP and GDP generated by industry and services indicates



V: *Percentage changes of individual GDP segments in relation to the total GDP in period 1990–2011*

|                           | Agriculture   | Industry      | Services     | Cumulative change of individual sectors' shares in the total GDP |
|---------------------------|---------------|---------------|--------------|--|
| Congo, Rep.               | 9.48%         | 35.98%        | 26.50%       | 71.97%   |
| Uganda                    | 31.81%        | 15.28%        | 16.53%       | 63.62%   |
| Malawi                    | 11.09%        | 12.42%        | 23.52%       | 47.03%   |
| Angola                    | 8.65%         | 21.28%        | 12.63%       | 42.55%   |
| Ghana                     | 20.95%        | 13.53%        | 7.42%        | 41.90%   |
| Burundi                   | 18.91%        | 1.63%         | 20.54%       | 41.08%   |
| Chad                      | 20.39%        | 8.84%         | 11.55%       | 40.79%   |
| Cote d'Ivoire             | 8.20%         | 19.76%        | 11.55%       | 39.52%   |
| Zambia                    | 1.16%         | 19.23%        | 18.07%       | 38.46%   |
| Eritrea                   | 17.30%        | 1.81%         | 19.11%       | 38.21%   |
| Mauritania                | 12.49%        | 18.57%        | 6.08%        | 37.14%   |
| Guinea                    | 4.42%         | 18.54%        | 14.12%       | 37.08%   |
| Tanzania                  | 16.92%        | 7.34%         | 9.58%        | 33.85%   |
| Mauritius                 | 7.72%         | 8.58%         | 16.31%       | 32.62%   |
| Sudan                     | 15.33%        | 11.97%        | 3.36%        | 30.67%   |
| Lesotho                   | 14.29%        | 0.19%         | 14.48%       | 28.96%   |
| <b>Sub-Saharan Africa</b> | <b>14.18%</b> | <b>12.93%</b> | <b>1.25%</b> | <b>28.36%</b>  |
| Botswana                  | 1.93%         | 11.98%        | 13.91%       | 27.83%   |
| Congo, Dem. Rep.          | 13.48%        | 5.63%         | 7.85%        | 26.96%   |
| Sierra Leone              | 10.54%        | 12.44%        | 1.91%        | 24.89%   |
| Tunisia                   | 7.53%         | 4.67%         | 12.20%       | 24.40%   |
| Mali                      | 9.06%         | 11.96%        | 2.90%        | 23.92%   |
| Namibia                   | 3.29%         | 8.15%         | 11.44%       | 22.88%   |
| South Africa              | 1.99%         | 9.22%         | 11.21%       | 22.41%   |
| Togo                      | 2.41%         | 6.69%         | 9.10%        | 18.20%   |
| Burkina Faso              | 3.16%         | 5.87%         | 9.03%        | 18.06%   |
| Rwanda                    | 0.49%         | 8.24%         | 8.74%        | 17.47%   |
| Ethiopia                  | 8.60%         | 1.44%         | 7.16%        | 17.20%   |
| Cameroon                  | 8.50%         | 6.42%         | 2.09%        | 17.00%   |
| Swaziland                 | 3.04%         | 7.77%         | 4.73%        | 15.54%   |
| Egypt, Arab Rep.          | 5.04%         | 7.10%         | 2.06%        | 14.19%   |
| Zimbabwe                  | 1.49%         | 6.48%         | 4.99%        | 12.96%   |
| Benin                     | 5.49%         | 6.37%         | 0.88%        | 12.73%   |
| Algeria                   | 5.06%         | 1.16%         | 6.22%        | 12.44%   |
| Comoros                   | 0.80%         | 6.12%         | 5.32%        | 12.24%   |
| Mozambique                | 6.04%         | 3.95%         | 2.09%        | 12.09%   |
| Gambia, The               | 5.46%         | 2.45%         | 3.00%        | 10.91%   |
| Seychelles                | 2.57%         | 2.66%         | 5.24%        | 10.48%   |
| Senegal                   | 4.50%         | 1.01%         | 3.49%        | 9.00%  |
| Morocco                   | 3.92%         | 0.46%         | 3.46%        | 7.83%  |
| Madagascar                | 2.92%         | 3.51%         | 0.59%        | 7.02%  |
| Kenya                     | 0.49%         | 2.42%         | 2.91%        | 5.82%  |
| World                     | 0.93%         | 1.17%         | 0.24%        | 2.34%  |

Source: own calculation, 2013

that there are no significant differences between Sub-Saharan countries and the world economy when evaluating elasticity and correlation during the monitored time period. In the case of services, Sub-Saharan countries recorded much lower level of the total GDP elasticity in relation to

VI: Basic characteristic of Sub-Saharan countries' GDP formation

| Sub-Saharan Africa<br>(constant 2005 US\$) | 1990  | 2011  | Basic<br>index | Chain<br>index | GDP/cap elasticity<br>in relation to 1% change<br>of below mentioned<br>variable | Correlation existing<br>between GDP/cap<br>and individual below<br>mentioned variables |
|--|-------|-------|----------------|----------------|--|--|
| GDP/cap                                    | 811   | 978   | 1.206          | 1.009          | X  | X  |
| Agriculture GDP/cap                        | 211   | 115   | 0.547          | 0.972          | 0.195  | -0.816   |
| Industry GDP/cap                           | 244   | 421   | 1.723          | 1.026          | 0.322  | 0.974  |
| Services GDP/cap                           | 356   | 442   | 1.240          | 1.010          | 0.562  | 0.896  |
| Sub-Saharan Africa<br>(constant 2005 US\$) | 1990  | 2011  | Basic<br>index | Chain<br>index | GDP elasticity in relation<br>to 1% change of below<br>mentioned variable        | Correlation existing<br>between GDP<br>and individual below<br>mentioned variables     |
| GDP (bn USD)                               | 411.6 | 867.9 | 2.109          | 1.036          | X  | X  |
| Agriculture (bn USD)                       | 106.8 | 102.2 | 0.957          | 0.998          | 0.152  | 0.297  |
| Industry (bn USD)                          | 124.0 | 373.6 | 3.014          | 1.054          | 0.319  | 0.993  |
| Services (bn USD)                          | 180.8 | 392.1 | 2.169          | 1.038          | 0.511  | 0.989  |

Source: own calculation, 2013

VII: Basic characteristic of world economy GDP formation

| World<br>(constant 2005 US\$) | 1990     | 2011     | Basic<br>index | Chain<br>index | GDP/cap elasticity<br>in relation to 1% change<br>of below mentioned<br>variable | Correlation existing<br>between GDP/cap<br>and individual below<br>mentioned variables |
|-------------------------------|----------|----------|----------------|----------------|--|--|
| GDP/cap                       | 5 738    | 7 538    | 1.31           | 1.013          | X  | X  |
| Agriculture GDP/cap           | 295      | 317      | 1.08           | 1.003          | 0.041  | 0.3237   |
| Industry GDP/cap              | 2 153    | 2 916    | 1.35           | 1.015          | 0.353  | 0.8962   |
| Services GDP/cap              | 3 291    | 4 305    | 1.31           | 1.013          | 0.608  | 0.9612   |
| World<br>(constant 2005 US\$) | 1990     | 2011     | Basic<br>index | Chain<br>index | GDP elasticity in relation<br>to 1% change of below<br>mentioned variable        | Correlation existing<br>between GDP<br>and individual below<br>mentioned variables     |
| GDP (bn USD)                  | 30,291.0 | 52,507.3 | 1.73           | 1.027          | X  | X  |
| Agriculture (bn USD)          | 1,556.6  | 2,209.6  | 1.42           | 1.017          | 0.0412   | 0.794  |
| Industry (bn USD)             | 11,363.2 | 20,310.9 | 1.79           | 1.028          | 0.3532   | 0.966  |
| Services (bn USD)             | 17,371.1 | 29,986.8 | 1.73           | 1.026          | 0.607  | 0.986  |

Source: own calculation, 2013

changes in the service sector; however the level of correlation between services and the total GDP reaches almost the same values in Sub-Saharan Africa and in the world.

The results of performed analysis confirm the above mentioned findings that the GDP development in Africa is much more depending on agricultural and industrial sectors than it is common in the world. This can be also confirmed by the analysis of the GDP development at a per capita level (for details see Tabs. V and VI). It is worth recalling that the GDP per capita for particular sectors of the economy is characterized by lower level of correlation in relation to the total GDP than it results for the aggregated GDP analysis. The analysis performed at a per capita basis also proved a significant relationship between the total GDP per capita and GDP per capita generated by agricultural sector. This result points to high

dependency of many people living in Sub-Saharan region on agricultural activities and on performance of the agricultural sector (Mwabu and Thorbecke, 2004).

Sub-Saharan region is very dependent on agricultural sector, especially if taken into account the number of economically active population in agriculture. When applying the Holub's methodology on labor market structure in surveyed countries, there can be found out that agriculture plays the most significant role in job creation in many below mentioned countries (Mwabu and Thorbecke, 2004). There is evident, most of Sub-Saharan countries are still in traditional stage of economic development (ASI model) in terms of labor market. Just some countries have reached the SIA or SAI model. Following finding is worth noting: while the majority of surveyed Sub-Saharan countries reached already SAI or SIA model

VIII: Selected characteristic of GDP in Sub-Saharan countries in relation to its individual components

| Elasticity existing between GDP and 1% change of below mentioned variables |                  |                    |               |                    | Correlation existing between GDP and below mentioned variables |                  |       |                    |               |                    |       |
|--|------------------|--------------------|---------------|--------------------|--|------------------|-------|--------------------|---------------|--------------------|-------|
|  | Agri-<br>culture |                    | Indus-<br>try | Ser-<br>vices      |  | Agri-<br>culture |       | Indus-<br>try      | Ser-<br>vices |                    |       |
| Ethiopia   | 0.502            | Botswana           | 0.579         | Seychelles         | 0.776  | Benin            | 0.983 | Uganda             | 0.998         | Mauritius          | 0.999 |
| Sierra Leone   | 0.502            | Algeria            | 0.573         | Gambia, The        | 0.627  | Egypt, Arab Rep. | 0.981 | Tanzania           | 0.998         | Egypt, Arab Rep.   | 0.998 |
| Burundi  | 0.494            | Angola             | 0.569         | World              | 0.607  | Burkina Faso     | 0.977 | Egypt, Arab Rep.   | 0.996         | Tunisia            | 0.997 |
| Comoros  | 0.443            | Swaziland          | 0.555         | Eritrea            | 0.602  | Rwanda           | 0.972 | Morocco            | 0.995         | Mozambique         | 0.997 |
| Congo, Dem. Rep.   | 0.429            | Congo, Rep.        | 0.553         | Uganda             | 0.595  | Mali             | 0.968 | Mauritius          | 0.995         | Morocco            | 0.996 |
| Uganda   | 0.419            | Lesotho            | 0.452         | Mauritius          | 0.578  | Ethiopia         | 0.966 | Swaziland          | 0.993         | Benin              | 0.996 |
| Rwanda   | 0.406            | South Africa       | 0.423         | Madagascar         | 0.564  | Mozambique       | 0.964 | Sub-Saharan Africa | 0.993         | Kenya              | 0.995 |
| Tanzania   | 0.400            | Guinea             | 0.423         | South Africa       | 0.552  | Guinea           | 0.957 | Tunisia            | 0.991         | Rwanda             | 0.995 |
| Mali   | 0.376            | Tunisia            | 0.417         | Senegal            | 0.538  | Sierra Leone     | 0.928 | Sudan              | 0.985         | Senegal            | 0.994 |
| Togo   | 0.363            | Zambia             | 0.415         | Namibia            | 0.519  | Kenya            | 0.926 | Angola             | 0.981         | South Africa       | 0.994 |
| Ghana  | 0.341            | Mauritania         | 0.401         | Congo, Rep.        | 0.516  | Tanzania         | 0.921 | Madagascar         | 0.980         | Uganda             | 0.993 |
| Sudan  | 0.331            | Namibia            | 0.390         | Benin              | 0.515  | Gambia, The      | 0.915 | South Africa       | 0.979         | Ethiopia           | 0.992 |
| Benin  | 0.328            | Zimbabwe           | 0.380         | Sub-Saharan Africa | 0.511  | Madagascar       | 0.908 | Kenya              | 0.978         | Tanzania           | 0.991 |
| Burkina Faso   | 0.319            | Egypt, Arab Rep.   | 0.364         | Mozambique         | 0.510  | Ghana            | 0.904 | Mali               | 0.978         | Sub-Saharan Africa | 0.989 |
| Malawi   | 0.312            | Chad               | 0.360         | Morocco            | 0.502  | Zambia           | 0.899 | Guinea             | 0.978         | Mali               | 0.989 |
| Kenya  | 0.258            | Cameroon           | 0.353         | Egypt, Arab Rep.   | 0.487  | Comoros          | 0.898 | Mozambique         | 0.975         | World              | 0.986 |
| Madagascar   | 0.254            | World              | 0.353         | Zimbabwe           | 0.484  | Senegal          | 0.882 | Mauritania         | 0.975         | Namibia            | 0.985 |
| Mozambique   | 0.246            | Malawi             | 0.340         | Tunisia            | 0.475  | Morocco          | 0.872 | Senegal            | 0.973         | Burkina Faso       | 0.985 |
| Zambia   | 0.241            | Morocco            | 0.338         | Sudan              | 0.467  | Togo             | 0.841 | Algeria            | 0.966         | Gambia, The        | 0.972 |
| Mauritania   | 0.227            | Cote d'Ivoire      | 0.323         | Kenya              | 0.457  | Angola           | 0.840 | Congo, Rep.        | 0.966         | Sudan              | 0.967 |
| Cameroon   | 0.224            | Mauritius          | 0.319         | Togo               | 0.441  | Malawi           | 0.839 | World              | 0.966         | Mauritania         | 0.967 |
| Gambia, The  | 0.222            | Sub-Saharan Africa | 0.319         | Cameroon           | 0.438  | Uganda           | 0.829 | Ethiopia           | 0.966         | Angola             | 0.961 |
| Cote d'Ivoire  | 0.221            | Senegal            | 0.310         | Lesotho            | 0.432  | Namibia          | 0.819 | Burkina Faso       | 0.966         | Lesotho            | 0.959 |
| Angola   | 0.195            | Kenya              | 0.287         | Burkina Faso       | 0.420  | World            | 0.794 | Namibia            | 0.963         | Seychelles         | 0.958 |
| Eritrea  | 0.182            | Mali               | 0.269         | Comoros            | 0.415  | Cameroon         | 0.792 | Botswana           | 0.956         | Zimbabwe           | 0.956 |
| Chad   | 0.165            | Ghana              | 0.265         | Rwanda             | 0.408  | Sudan            | 0.772 | Cameroon           | 0.936         | Malawi             | 0.956 |
| Morocco  | 0.161            | Tanzania           | 0.262         | Botswana           | 0.393  | Zimbabwe         | 0.703 | Benin              | 0.933         | Togo               | 0.955 |
| Guinea   | 0.161            | Burkina Faso       | 0.260         | Cote d'Ivoire      | 0.390  | Tunisia          | 0.646 | Rwanda             | 0.924         | Cameroon           | 0.953 |
| Sub-Saharan Africa   | 0.152            | Sierra Leone       | 0.252         | Ethiopia           | 0.383  | Congo, Dem. Rep. | 0.583 | Chad               | 0.914         | Madagascar         | 0.952 |

| Elasticity existing between GDP and 1% change of below mentioned variables |                  |                  |               | Correlation existing between GDP and below mentioned variables |                  |               |               |                  |        |                  |        |
|--|------------------|------------------|---------------|--|------------------|---------------|---------------|------------------|--------|------------------|--------|
|  | Agri-<br>culture | Indus-<br>try    | Ser-<br>vices |  | Agri-<br>culture | Indus-<br>try | Ser-<br>vices |                  |        |                  |        |
| Egypt, Arab Rep.   | 0.152            | Burundi          | 0.251         | Ghana  | 0.378            | Botswana      | 0.531         | Lesotho          | 0.913  | Ghana            | 0.950  |
| Senegal  | 0.148            | Congo, Dem. Rep. | 0.232         | Tanzania   | 0.374            | Burundi       | 0.373         | Eritrea          | 0.875  | Botswana         | 0.945  |
| Tunisia  | 0.137            | Mozambique       | 0.231         | Chad   | 0.374            | Cote d'Ivoire | 0.311         | Malawi           | 0.871  | Swaziland        | 0.943  |
| Zimbabwe   | 0.122            | Sudan            | 0.216         | Algeria  | 0.366            | Sub-Saharan   | 0.297         | Comoros          | 0.864  | Congo, Dem. Rep. | 0.938  |
| Lesotho  | 0.113            | Eritrea          | 0.215         | Swaziland  | 0.363            | South Africa  | 0.229         | Gambia, The      | 0.853  | Sierra Leone     | 0.915  |
| Namibia  | 0.091            | Seychelles       | 0.213         | Mauritania   | 0.359            | Algeria       | 0.198         | Zimbabwe         | 0.829  | Eritrea          | 0.907  |
| Algeria  | 0.080            | Rwanda           | 0.197         | Guinea   | 0.358            | Eritrea       | 0.185         | Ghana            | 0.809  | Zambia           | 0.905  |
| Swaziland  | 0.078            | Madagascar       | 0.195         | Burundi  | 0.353            | Mauritania    | 0.044         | Congo, Dem. Rep. | 0.788  | Algeria          | 0.784  |
| Botswana   | 0.042            | Togo             | 0.192         | Mali   | 0.345            | Seychelles    | -0.182        | Burundi          | 0.787  | Chad             | 0.729  |
| World  | 0.041            | Benin            | 0.156         | Malawi   | 0.345            | Swaziland     | -0.244        | Zambia           | 0.763  | Burundi          | 0.648  |
| South Africa   | 0.029            | Gambia, The      | 0.151         | Zambia   | 0.321            | Chad          | -0.517        | Cote d'Ivoire    | 0.751  | Comoros          | 0.505  |
| Mauritius  | 0.023            | Comoros          | 0.118         | Congo, Dem. Rep.   | 0.320            | Lesotho       | -0.543        | Togo             | 0.657  | Guinea           | 0.388  |
| Seychelles   | 0.011            | Ethiopia         | 0.106         | Sierra Leone   | 0.242            | Mauritius     | -0.729        | Seychelles       | 0.335  | Cote d'Ivoire    | 0.291  |
| Congo, Rep.  | -0.072           | Uganda           | 0.058         | Angola   | 0.219            | Congo, Rep.   | -0.733        | Sierra Leone     | -0.355 | Congo, Rep.      | -0.459 |

Source: own calculation, 2013

IX: *Distribution of economically active persons among individual sectors of selected Sub-Saharan countries' economy (in %)*

| SIA                   |      |                       |      |                       |      |
|-----------------------|------|-----------------------|------|-----------------------|------|
| Agriculture           |      | Industry              |      | Services              |      |
| Angola                | 5.1  | Angola                | 20.6 | Angola                | 66.6 |
| Namibia               | 16.3 | Namibia               | 17.7 | Namibia               | 65.9 |
| Mauritius             | 8.7  | Mauritius             | 28.2 | Mauritius             | 63.1 |
| South Africa          | 4.9  | South Africa          | 24.5 | South Africa          | 61.9 |
| Algeria               | 11.7 | Algeria               | 33.1 | Algeria               | 55.2 |
| SAI                   |      |                       |      |                       |      |
| Gabon                 | 24.2 | Gabon                 | 11.8 | Gabon                 | 64   |
| Botswana              | 29.9 | Botswana              | 15.2 | Botswana              | 54.9 |
| Sao Tome and Principe | 27.9 | Sao Tome and Principe | 19.2 | Sao Tome and Principe | 52.4 |
| Congo, Rep.           | 35.4 | Congo, Rep.           | 20.6 | Congo, Rep.           | 42.2 |
| Senegal               | 33.7 | Senegal               | 14.8 | Senegal               | 36.1 |
| ASI                   |      |                       |      |                       |      |
| Benin                 | 42.7 | Benin                 | 9.5  | Benin                 | 46.2 |
| Liberia               | 48.9 | Liberia               | 9.2  | Liberia               | 41.9 |
| Nigeria               | 44.6 | Nigeria               | 11.5 | Nigeria               | 41.7 |
| Togo                  | 54.1 | Togo                  | 6.8  | Togo                  | 37.5 |
| Cameroon              | 53.3 | Cameroon              | 12.6 | Cameroon              | 34.1 |
| Kenya                 | 61.1 | Kenya                 | 6.7  | Kenya                 | 32.2 |
| Niger                 | 56.9 | Niger                 | 11.1 | Niger                 | 31.1 |
| Ghana                 | 57.2 | Ghana                 | 13.6 | Ghana                 | 29.1 |
| Uganda                | 65.6 | Uganda                | 6    | Uganda                | 28.4 |
| Mali                  | 66   | Mali                  | 5.6  | Mali                  | 28.3 |
| Gambia, The           | 64.7 | Gambia, The           | 6.1  | Gambia, The           | 27.8 |
| Sierra Leone          | 68.5 | Sierra Leone          | 6.5  | Sierra Leone          | 25   |
| Zambia                | 72.2 | Zambia                | 7.1  | Zambia                | 20.6 |
| Tanzania              | 76.5 | Tanzania              | 4.3  | Tanzania              | 19.2 |
| Lesotho               | 72.3 | Lesotho               | 9.3  | Lesotho               | 18.3 |
| Guinea                | 76   | Guinea                | 5.9  | Guinea                | 18.1 |
| Equatorial Guinea     | 76.3 | Equatorial Guinea     | 4.8  | Equatorial Guinea     | 17.6 |
| Rwanda                | 78.8 | Rwanda                | 3.8  | Rwanda                | 16.6 |
| Mozambique            | 80.5 | Mozambique            | 3.4  | Mozambique            | 16.1 |
| Madagascar            | 80.4 | Madagascar            | 3.7  | Madagascar            | 15.8 |
| Zimbabwe              | 64.8 | Zimbabwe              | 9.3  | Zimbabwe              | 15.3 |
| Chad                  | 83   | Chad                  | 2.1  | Chad                  | 14.5 |
| Ethiopia              | 79.3 | Ethiopia              | 6.6  | Ethiopia              | 13   |
| Burkina Faso          | 84.8 | Burkina Faso          | 3.1  | Burkina Faso          | 12.2 |
| Burundi               | 92.2 | Burundi               | 2.2  | Burundi               | 5.6  |

Source: WDI database and own calculations, 2013

(modern type of economy) in terms of economic structure, the traditional type of economy (ASI model) dominates when labor market is taken into account. Low number of workforce in industry and low level of industrial development on one hand, and very high level of employment in agriculture on the other hand remain essential problems of the region (Tiffen, 2003; Kingdon, Sandefur and Teal, 2006). Underdeveloped infrastructure (Ajakiye and Ncube, 2010) and low

level of development in industrial and service sectors are factors dragging Sub-Saharan economy down. Population living in the region does not have any other choice but to remain in agricultural, however agriculture is characterized by low economic performance and also by limited value added per capita as well as by low level of wages (Rezek, Campbell, Randall and Rogers, 2011; Henley, 2012).



X: Basic characteristic of individual Sub-Saharan countries' GDP/cap structure and value development in period 1990–2011 (in USD 2005 constant prices)

| Country Name     | (constant 2005 US\$) | 1990  | 2011  | Basic index | Chain index | Country Name | (constant 2005 US\$) | 1990  | 2011   | Basic index | Chain index |
|------------------|----------------------|-------|-------|-------------|-------------|--------------|----------------------|-------|--------|-------------|-------------|
| Angola           | Agriculture          | 283   | 241   | 0.85        | 0.992       | Malawi       | Agriculture          | 73    | 72     | 0.98        | 0.999       |
| Angola           | Industry             | 645   | 1 611 | 2.50        | 1.045       | Malawi       | Industry             | 74    | 70     | 0.94        | 0.997       |
| Angola           | Services             | 651   | 741   | 1.14        | 1.006       | Malawi       | Services             | 42    | 120    | 2.84        | 1.051       |
| Benin            | Agriculture          | 159   | 162   | 1.02        | 1.001       | Mali         | Agriculture          | 145   | 174    | 1.20        | 1.009       |
| Benin            | Industry             | 57    | 104   | 1.83        | 1.029       | Mali         | Industry             | 61    | 151    | 2.48        | 1.044       |
| Benin            | Services             | 242   | 288   | 1.19        | 1.008       | Mali         | Services             | 123   | 171    | 1.39        | 1.016       |
| Botswana         | Agriculture          | 149   | 171   | 1.15        | 1.007       | Mauritania   | Agriculture          | 172   | 112    | 0.65        | 0.980       |
| Botswana         | Industry             | 2 093 | 3 406 | 1.63        | 1.023       | Mauritania   | Industry             | 234   | 436    | 1.86        | 1.030       |
| Botswana         | Services             | 1 046 | 3 016 | 2.88        | 1.052       | Mauritania   | Services             | 241   | 248    | 1.03        | 1.001       |
| Burkina Faso     | Agriculture          | 75    | 144   | 1.91        | 1.031       | Mauritius    | Agriculture          | 331   | 207    | 0.62        | 0.978       |
| Burkina Faso     | Industry             | 66    | 140   | 2.13        | 1.037       | Mauritius    | Industry             | 1 308 | 2 252  | 1.72        | 1.026       |
| Burkina Faso     | Services             | 128   | 179   | 1.39        | 1.016       | Mauritius    | Services             | 1 399 | 4 074  | 2.91        | 1.052       |
| Burundi          | Agriculture          | 111   | 49    | 0.44        | 0.961       | Mozambique   | Agriculture          | 64    | 112    | 1.75        | 1.027       |
| Burundi          | Industry             | 57    | 37    | 0.65        | 0.980       | Mozambique   | Industry             | 47    | 116    | 2.47        | 1.044       |
| Burundi          | Services             | 50    | 66    | 1.32        | 1.013       | Mozambique   | Services             | 76    | 171    | 2.24        | 1.039       |
| Cameroon         | Agriculture          | 240   | 146   | 0.61        | 0.977       | Namibia      | Agriculture          | 282   | 305    | 1.08        | 1.004       |
| Cameroon         | Industry             | 311   | 353   | 1.14        | 1.006       | Namibia      | Industry             | 1 181 | 1 513  | 1.28        | 1.012       |
| Cameroon         | Services             | 449   | 442   | 0.98        | 0.999       | Namibia      | Services             | 1 210 | 2 382  | 1.97        | 1.033       |
| Comoros          | Agriculture          | 304   | 245   | 0.81        | 0.990       | Rwanda       | Agriculture          | 77    | 119    | 1.55        | 1.021       |
| Comoros          | Industry             | 61    | 87    | 1.43        | 1.017       | Rwanda       | Industry             | 58    | 61     | 1.05        | 1.002       |
| Comoros          | Services             | 369   | 271   | 0.74        | 0.986       | Rwanda       | Services             | 101   | 191    | 1.89        | 1.031       |
| Congo, Dem. Rep. | Agriculture          | 90    | 69    | 0.77        | 0.987       | Senegal      | Agriculture          | 122   | 106    | 0.87        | 0.994       |
| Congo, Dem. Rep. | Industry             | 92    | 40    | 0.43        | 0.961       | Senegal      | Industry             | 205   | 247    | 1.21        | 1.009       |
| Congo, Dem. Rep. | Services             | 116   | 49    | 0.42        | 0.960       | Senegal      | Services             | 354   | 441    | 1.24        | 1.010       |
| Congo, Rep.      | Agriculture          | 234   | 65    | 0.28        | 0.941       | Seychelles   | Agriculture          | 412   | 312    | 0.76        | 0.987       |
| Congo, Rep.      | Industry             | 738   | 1 473 | 1.99        | 1.033       | Seychelles   | Industry             | 1 392 | 1 897  | 1.36        | 1.015       |
| Congo, Rep.      | Services             | 845   | 384   | 0.45        | 0.963       | Seychelles   | Services             | 6 757 | 11 745 | 1.74        | 1.027       |
| Cote d'Ivoire    | Agriculture          | 350   | 217   | 0.62        | 0.978       | Sierra Leone | Agriculture          | 161   | 210    | 1.30        | 1.013       |
| Cote d'Ivoire    | Industry             | 249   | 384   | 1.54        | 1.021       | Sierra Leone | Industry             | 88    | 45     | 0.51        | 0.968       |
| Cote d'Ivoire    | Services             | 477   | 293   | 0.62        | 0.977       | Sierra Leone | Services             | 116   | 130    | 1.12        | 1.005       |
| Eritrea          | Agriculture          | 49    | 19    | 0.40        | 0.957       | South Africa | Agriculture          | 204   | 131    | 0.64        | 0.979       |
| Eritrea          | Industry             | 38    | 38    | 0.98        | 0.999       | South Africa | Industry             | 2 215 | 2 156  | 0.97        | 0.999       |
| Eritrea          | Services             | 92    | 136   | 1.48        | 1.019       | South Africa | Services             | 2 437 | 3 637  | 1.49        | 1.019       |
| Ethiopia         | Agriculture          | 74    | 104   | 1.41        | 1.017       | Sudan        | Agriculture          | 221   | 225    | 1.02        | 1.001       |
| Ethiopia         | Industry             | 22    | 41    | 1.85        | 1.030       | Sudan        | Industry             | 105   | 290    | 2.77        | 1.050       |
| Ethiopia         | Services             | 47    | 97    | 2.06        | 1.035       | Sudan        | Services             | 240   | 435    | 1.81        | 1.029       |
| Gambia, The      | Agriculture          | 103   | 82    | 0.79        | 0.989       | Swaziland    | Agriculture          | 179   | 141    | 0.79        | 0.989       |
| Gambia, The      | Industry             | 47    | 58    | 1.25        | 1.011       | Swaziland    | Industry             | 1 038 | 1 430  | 1.38        | 1.015       |
| Gambia, The      | Services             | 275   | 293   | 1.07        | 1.003       | Swaziland    | Services             | 800   | 843    | 1.05        | 1.003       |
| Ghana            | Agriculture          | 171   | 164   | 0.96        | 0.998       | Tanzania     | Agriculture          | 123   | 114    | 0.93        | 0.996       |
| Ghana            | Industry             | 66    | 211   | 3.22        | 1.057       | Tanzania     | Industry             | 72    | 145    | 2.01        | 1.034       |
| Ghana            | Services             | 144   | 311   | 2.16        | 1.037       | Tanzania     | Services             | 97    | 194    | 1.99        | 1.033       |
| Guinea           | Agriculture          | 71    | 62    | 0.87        | 0.994       | Togo         | Agriculture          | 144   | 126    | 0.88        | 0.994       |
| Guinea           | Industry             | 88    | 150   | 1.71        | 1.026       | Togo         | Industry             | 96    | 64     | 0.66        | 0.981       |
| Guinea           | Services             | 127   | 93    | 0.73        | 0.985       | Togo         | Services             | 186   | 212    | 1.14        | 1.006       |
| Chad             | Agriculture          | 91    | 37    | 0.41        | 0.958       | Uganda       | Agriculture          | 105   | 87     | 0.83        | 0.991       |
| Chad             | Industry             | 71    | 152   | 2.15        | 1.037       | Uganda       | Industry             | 32    | 128    | 3.98        | 1.068       |
| Chad             | Services             | 165   | 309   | 1.87        | 1.030       | Uganda       | Services             | 60    | 191    | 3.16        | 1.056       |

| Country Name       | (constant 2005 US\$) | 1990 | 2011 | Basic index | Chain index | Country Name | (constant 2005 US\$) | 1990  | 2011  | Basic index | Chain index |
|--------------------|----------------------|------|------|-------------|-------------|--------------|----------------------|-------|-------|-------------|-------------|
| Kenya              | Agriculture          | 141  | 145  | 1.03        | 1.001       | Zambia       | Agriculture          | 123   | 149   | 1.21        | 1.009       |
| Kenya              | Industry             | 170  | 164  | 0.97        | 0.998       | Zambia       | Industry             | 385   | 290   | 0.75        | 0.986       |
| Kenya              | Services             | 245  | 275  | 1.12        | 1.005       | Zambia       | Services             | 168   | 330   | 1.96        | 1.033       |
| Lesotho            | GDP                  | 511  | 903  | 1.77        | 1.028       | Zimbabwe     | GDP                  | 679   | 419   | 0.62        | 0.977       |
| Lesotho            | Agriculture          | 113  | 71   | 0.63        | 0.978       | Zimbabwe     | Agriculture          | 101   | 56    | 0.56        | 0.972       |
| Lesotho            | Industry             | 210  | 370  | 1.76        | 1.027       | Zimbabwe     | Industry             | 270   | 194   | 0.72        | 0.984       |
| Lesotho            | Services             | 188  | 462  | 2.46        | 1.044       | Zimbabwe     | Services             | 308   | 169   | 0.55        | 0.972       |
| Madagascar         | Agriculture          | 86   | 63   | 0.74        | 0.986       |              |                      |       |       |             |             |
| Madagascar         | Industry             | 67   | 65   | 0.97        | 0.999       |              |                      |       |       |             |             |
| Madagascar         | Services             | 176  | 144  | 0.82        | 0.991       |              |                      |       |       |             |             |
| Sub-Saharan Africa | GDP                  | 811  | 978  | 1.21        | 1.009       | World        | GDP                  | 5 738 | 7 538 | 1.31        | 1.013       |
| Sub-Saharan Africa | Agriculture          | 211  | 115  | 0.55        | 0.972       | World        | Agriculture          | 295   | 317   | 1.08        | 1.003       |
| Sub-Saharan Africa | Industry             | 244  | 421  | 1.72        | 1.026       | World        | Industry             | 2 153 | 2 916 | 1.35        | 1.015       |
| Sub-Saharan Africa | Services             | 356  | 442  | 1.24        | 1.010       | World        | Services             | 3 291 | 4 305 | 1.31        | 1.013       |

Source: WDI database and own calculations, 2013

XI: Basic characteristic of individual Sub-Saharan countries' GDP structure and value development in period 1990–2011 (in billions USD, in 2005 constant prices)

| Country Name  | Indicator Name | 1990 | 2011  | Basic index | Chain index | Country Name | Indicator Name | 1990 | 2011 | Basic index | Chain index |
|---------------|----------------|------|-------|-------------|-------------|--------------|----------------|------|------|-------------|-------------|
| Angola        | Agriculture    | 2.93 | 4.86  | 1.66        | 1.024       | Malawi       | Agriculture    | 0.69 | 1.11 | 1.61        | 1.023       |
| Angola        | Industry       | 6.67 | 32.52 | 4.88        | 1.078       | Malawi       | Industry       | 0.70 | 1.08 | 1.55        | 1.021       |
| Angola        | Services       | 6.73 | 14.96 | 2.22        | 1.039       | Malawi       | Services       | 0.40 | 1.85 | 4.65        | 1.076       |
| Benin         | Agriculture    | 0.79 | 1.58  | 1.99        | 1.033       | Mali         | Agriculture    | 1.16 | 2.51 | 2.17        | 1.038       |
| Benin         | Industry       | 0.29 | 1.02  | 3.57        | 1.063       | Mali         | Industry       | 0.49 | 2.18 | 4.49        | 1.074       |
| Benin         | Services       | 1.21 | 2.82  | 2.33        | 1.041       | Mali         | Services       | 0.98 | 2.47 | 2.52        | 1.045       |
| Botswana      | Agriculture    | 0.21 | 0.34  | 1.65        | 1.024       | Mauritania   | Agriculture    | 0.35 | 0.41 | 1.19        | 1.008       |
| Botswana      | Industry       | 2.90 | 6.77  | 2.34        | 1.041       | Mauritania   | Industry       | 0.47 | 1.61 | 3.41        | 1.060       |
| Botswana      | Services       | 1.45 | 5.99  | 4.14        | 1.070       | Mauritania   | Services       | 0.49 | 0.92 | 1.88        | 1.031       |
| Burkina Faso  | Agriculture    | 0.66 | 2.30  | 3.47        | 1.061       | Mauritius    | Agriculture    | 0.35 | 0.27 | 0.76        | 0.987       |
| Burkina Faso  | Industry       | 0.58 | 2.25  | 3.87        | 1.067       | Mauritius    | Industry       | 1.38 | 2.90 | 2.09        | 1.036       |
| Burkina Faso  | Services       | 1.13 | 2.86  | 2.53        | 1.045       | Mauritius    | Services       | 1.48 | 5.24 | 3.54        | 1.062       |
| Burundi       | Agriculture    | 0.62 | 0.47  | 0.75        | 0.986       | Mozambique   | Agriculture    | 0.86 | 2.75 | 3.18        | 1.057       |
| Burundi       | Industry       | 0.32 | 0.35  | 1.11        | 1.005       | Mozambique   | Industry       | 0.63 | 2.84 | 4.47        | 1.074       |
| Burundi       | Services       | 0.28 | 0.63  | 2.24        | 1.039       | Mozambique   | Services       | 1.04 | 4.21 | 4.06        | 1.069       |
| Cameroon      | Agriculture    | 2.90 | 3.08  | 1.07        | 1.003       | Namibia      | Agriculture    | 0.40 | 0.68 | 1.70        | 1.025       |
| Cameroon      | Industry       | 3.75 | 7.47  | 1.99        | 1.033       | Namibia      | Industry       | 1.67 | 3.35 | 2.01        | 1.034       |
| Cameroon      | Services       | 5.42 | 9.35  | 1.73        | 1.026       | Namibia      | Services       | 1.71 | 5.28 | 3.08        | 1.055       |
| Comoros       | Agriculture    | 0.13 | 0.17  | 1.37        | 1.015       | Rwanda       | Agriculture    | 0.55 | 1.32 | 2.39        | 1.042       |
| Comoros       | Industry       | 0.02 | 0.06  | 2.43        | 1.043       | Rwanda       | Industry       | 0.42 | 0.68 | 1.62        | 1.023       |
| Comoros       | Services       | 0.15 | 0.19  | 1.25        | 1.011       | Rwanda       | Services       | 0.73 | 2.13 | 2.92        | 1.052       |
| Congo, DR     | Agriculture    | 3.13 | 4.40  | 1.41        | 1.016       | Senegal      | Agriculture    | 0.92 | 1.42 | 1.55        | 1.021       |
| Congo, DR     | Industry       | 3.20 | 2.54  | 0.79        | 0.989       | Senegal      | Industry       | 1.54 | 3.29 | 2.14        | 1.037       |
| Congo, DR     | Services       | 4.05 | 3.14  | 0.78        | 0.988       | Senegal      | Services       | 2.66 | 5.87 | 2.21        | 1.038       |
| Congo, Rep.   | GDP            | 4.33 | 8.12  | 1.88        | 1.030       | Seychelles   | GDP            | 0.60 | 1.22 | 2.04        | 1.034       |
| Congo, Rep.   | Agriculture    | 0.56 | 0.27  | 0.49        | 0.967       | Seychelles   | Agriculture    | 0.03 | 0.03 | 0.95        | 0.997       |
| Congo, Rep.   | Industry       | 1.76 | 6.22  | 3.54        | 1.062       | Seychelles   | Industry       | 0.10 | 0.17 | 1.70        | 1.026       |
| Congo, Rep.   | Services       | 2.01 | 1.62  | 0.81        | 0.990       | Seychelles   | Services       | 0.47 | 1.03 | 2.17        | 1.038       |
| Cote d'Ivoire | Agriculture    | 4.24 | 4.22  | 1.00        | 1.000       | Sierra Leone | Agriculture    | 0.65 | 1.23 | 1.89        | 1.031       |
| Cote d'Ivoire | Industry       | 3.02 | 7.45  | 2.47        | 1.044       | Sierra Leone | Industry       | 0.36 | 0.26 | 0.74        | 0.986       |
| Cote d'Ivoire | Services       | 5.78 | 5.69  | 0.98        | 0.999       | Sierra Leone | Services       | 0.47 | 0.76 | 1.62        | 1.023       |

| Country Name | Indicator Name | 1990   | 2011   | Basic index | Chain index | Country Name | Indicator Name | 1990     | 2011     | Basic index | Chain index |
|--------------|----------------|--------|--------|-------------|-------------|--------------|----------------|----------|----------|-------------|-------------|
| Eritrea      | Agriculture    | 0.16   | 0.12   | 0.72        | 0.984       | South Africa | Agriculture    | 7.19     | 6.63     | 0.92        | 0.996       |
| Eritrea      | Industry       | 0.13   | 0.22   | 1.78        | 1.028       | South Africa | Industry       | 77.95    | 109.06   | 1.40        | 1.016       |
| Eritrea      | Services       | 0.30   | 0.81   | 2.68        | 1.048       | South Africa | Services       | 85.78    | 183.98   | 2.14        | 1.037       |
| Ethiopia     | Agriculture    | 3.55   | 9.31   | 2.62        | 1.047       | Sudan        | Agriculture    | 4.41     | 8.20     | 1.86        | 1.030       |
| Ethiopia     | Industry       | 1.07   | 3.67   | 3.44        | 1.061       | Sudan        | Industry       | 2.09     | 10.55    | 5.04        | 1.080       |
| Ethiopia     | Services       | 2.25   | 8.64   | 3.84        | 1.066       | Sudan        | Services       | 4.80     | 15.86    | 3.30        | 1.059       |
| Gambia, The  | Agriculture    | 0.09   | 0.14   | 1.50        | 1.019       | Swaziland    | Agriculture    | 0.15     | 0.17     | 1.10        | 1.005       |
| Gambia, The  | Industry       | 0.04   | 0.10   | 2.36        | 1.042       | Swaziland    | Industry       | 0.90     | 1.73     | 1.94        | 1.032       |
| Gambia, The  | Services       | 0.25   | 0.51   | 2.02        | 1.034       | Swaziland    | Services       | 0.69     | 1.02     | 1.48        | 1.019       |
| Ghana        | Agriculture    | 2.49   | 4.07   | 1.63        | 1.024       | Tanzania     | Agriculture    | 3.13     | 5.27     | 1.68        | 1.025       |
| Ghana        | Industry       | 0.96   | 5.24   | 5.46        | 1.084       | Tanzania     | Industry       | 1.84     | 6.72     | 3.65        | 1.064       |
| Ghana        | Services       | 2.11   | 7.72   | 3.66        | 1.064       | Tanzania     | Services       | 2.48     | 9.00     | 3.63        | 1.063       |
| Guinea       | Agriculture    | 0.42   | 0.69   | 1.62        | 1.023       | Togo         | Agriculture    | 0.54     | 0.81     | 1.50        | 1.019       |
| Guinea       | Industry       | 0.53   | 1.67   | 3.16        | 1.056       | Togo         | Industry       | 0.36     | 0.41     | 1.13        | 1.006       |
| Guinea       | Services       | 0.77   | 1.03   | 1.35        | 1.014       | Togo         | Services       | 0.70     | 1.37     | 1.95        | 1.032       |
| Chad         | Agriculture    | 0.54   | 0.45   | 0.83        | 0.991       | Uganda       | Agriculture    | 1.85     | 3.06     | 1.66        | 1.024       |
| Chad         | Industry       | 0.42   | 1.83   | 4.36        | 1.073       | Uganda       | Industry       | 0.56     | 4.49     | 7.98        | 1.104       |
| Chad         | Services       | 0.98   | 3.73   | 3.80        | 1.066       | Uganda       | Services       | 1.06     | 6.70     | 6.34        | 1.092       |
| Kenya        | Agriculture    | 3.30   | 6.09   | 1.85        | 1.030       | Zambia       | Agriculture    | 0.97     | 2.03     | 2.10        | 1.036       |
| Kenya        | Industry       | 3.98   | 6.91   | 1.74        | 1.027       | Zambia       | Industry       | 3.02     | 3.95     | 1.31        | 1.013       |
| Kenya        | Services       | 5.74   | 11.54  | 2.01        | 1.034       | Zambia       | Services       | 1.32     | 4.49     | 3.41        | 1.060       |
| Lesotho      | Agriculture    | 0.18   | 0.14   | 0.79        | 0.989       | Zimbabwe     | Agriculture    | 1.05     | 0.75     | 0.71        | 0.984       |
| Lesotho      | Industry       | 0.34   | 0.75   | 2.24        | 1.039       | Zimbabwe     | Industry       | 2.82     | 2.59     | 0.92        | 0.996       |
| Lesotho      | Services       | 0.30   | 0.94   | 3.13        | 1.056       | Zimbabwe     | Services       | 3.22     | 2.26     | 0.70        | 0.983       |
| Madagascar   | Agriculture    | 0.99   | 1.37   | 1.38        | 1.016       |              |                |          |          |             |             |
| Madagascar   | Industry       | 0.78   | 1.42   | 1.83        | 1.029       |              |                |          |          |             |             |
| Madagascar   | Services       | 2.03   | 3.13   | 1.54        | 1.021       |              |                |          |          |             |             |
| Sub-Saharan  | GDP            | 411.57 | 867.87 | 2.11        | 1.036       | World        | GDP            | 30290.96 | 52507.35 | 1.73        | 1.027       |
| Sub-Saharan  | Agriculture    | 106.82 | 102.19 | 0.96        | 0.998       | World        | Agriculture    | 1556.58  | 2209.65  | 1.42        | 1.017       |
| Sub-Saharan  | Industry       | 123.96 | 373.61 | 3.01        | 1.054       | World        | Industry       | 11363.23 | 20310.89 | 1.79        | 1.028       |
| Sub-Saharan  | GDP            | 180.78 | 392.07 | 2.17        | 1.038       | World        | Services       | 17371.14 | 29986.81 | 1.73        | 1.026       |

Source: WDI database and own calculations, 2013

## CONCLUSION

The analysis is confirming the fact that the Sub-Saharan Africa represents poor region. If we compare its GDP and GDP per capita performance to world or developed countries GDP and GDP/cap performance, we find out that Sub-Saharan Africa is far from usual standards. Despite of low value of economy performance, it is necessary to highlight the fact that Sub-Saharan inter-annual GDP growth rate is much higher in comparison to the world average, on the other hand its GDP/cap inter-annual growth rate is significantly under the world average. The problem of Sub-Saharan Africa is high level of population growth which is not accompanied by a proportional growth of the economy (Jenicek, 2010b; Ezech, Bongaarts and Mberu, 2012). This can explain why the annual growth of the GDP per capita in Sub-Saharan region is far behind the annual growth of the Sub-Saharan economy as a total. Another remarkable fact is the quite specific

structure of the Sub-Saharan economy. The whole region is characterized by high importance of agriculture and industry within the total economy (much more than it is typical for the world economy). On the other hand, the service sector is still not fully developed. While in the world the main driver of GDP growth is services sector (cc 60%) and the role of agricultural sector (4.2%) and industry sector (38%) in area of GDP value growth is diminishing, in Sub-Saharan still important drivers of economy growth are agricultural sector (cc 12%) and industry (43%) (However the share of agricultural sector was significantly reduced from 26% in 1990 to above mentioned 12%). Despite of the fact that Sub-Saharan Africa is developing and its economy is also changing its structure – the services sector is still not fully developed and its potential to generate added value is not utilized. In this case it is necessary to highlight the fact that the low level of services sector development represents a barrier not only

for economy transformation, but also for labor market transformation. In Sub-Saharan Africa more than 50% of economically active population (220 mil. out of 420 mil. people) is still working in agricultural sector.

Another important finding resulting from the analysis is the existence of significant differences within Sub-Saharan countries in relation to the development of their total GDP value and GDP structure. Considering the economic structure of surveyed countries, all four types of economies – SAI, SIA, ISA and ASI (Holub, 1970) can be found in sub-Sahara. Taking into account the labor market, three types of economies SIA, SA and ASI will result. There is evident that many economies are still in developing or transformation process. When analyzing differences which exist among Sub-Saharan countries, they appear distinct in their GDP, especially in per capita expression. Many countries within the surveyed sample reach their GDP per capita in the range from 1.000 and 12.000 USD a year (22 from 43 countries), but there are also many countries (21 from 43), where the GDP per capita reaches a value just from 245 to 900 USD a year. When analyzing individual countries more in detail, significant differences will appear in relation to annual economic growth and GDP per capita. There are such countries (Uganda, Mozambique, Angola, Ethiopia, Burkina Faso, Chad, Ghana, Sudan, Botswana, Tanzania) which GDP exceeded 5% growth a year during the monitored period, but there are even countries with a negative GDP growth (Congo D.R. or Zimbabwe).

The huge differences existing among individual countries' economy are result of specific historical, political, cultural and social consequences. Sub-Saharan Africa is from economy point of view the least developed region in the world. The main problem of its economy development is low level of infrastructure, low level of investments and international subsidies and aid. There are some countries which economies are possible to consider as stable one, but on the other hand there are several countries which economy are collapsed one. Low level of economy development and limited diversification of economy activities are the significant barrier of intra-regional economy growth. Individual countries are not able – or it is very difficult – to cooperate together. Their mutual trade represents less than fifteen percent of their total trade performance. Individual economies' growth is heavily dependent especially on its domestic market performance growth or on inter-regional economy growth. This situation is not really very good for future development – individual countries domestic market's ability to stimulate economy growth is very limited and inter-regional cooperation is focused especially on export of raw materials and low added value products. Moreover inter regional trade is connected to extra costs for transportation of products from Africa to other regions. One of the weakest points of Sub-Saharan

region economy growth is disability of individual countries to cooperate together (It is necessary to mention the fact that cooperation is very difficult because of limited diversification of individual countries' economy activities. Individual countries (among themselves) are not able to take advantage from applying of comparative advantages trade approaches.).

Finally – it can be concluded that Sub-Saharan economy is very vulnerable and sensitive both to regional and world economic development. The region is facing political instability and also high level of corruption, democratic deficit, low level of education, limited investments, criminality, local conflicts, civil wars etc. (Collier and Vicente, 2012; Bezemer and Jong-A-Pin, 2013; Barbier, 2010). Sub-Saharan Africa is also plagued by an intensive population growth, which is not accompanied by proportional economic growth. Among other significant problems of the region belongs a disproportion in relation to income distribution. In the poorest region of the world lives a large number of very rich people on one hand, and much more of really poor ones on the other hand (Go, Nikitin and Wang, 2007). Disproportions persisting in income distribution will become a big problem for stability of the region in the future (Thorbecke, 2013). From the economic point of view, it is worth to note that transformation process in Sub-Saharan Africa still did not reach the level of the global economic transformation. Low level of industry and services sector's share in total GDP value development is a barrier for economy transformation. Both sectors are not able to generate enough job opportunities and many people do not have any other possibility than to work in primary sector or to be unemployed. Many people more than 65% are working in primary sectors (agriculture or mining activities) and their ability to generate high level of added value is very limited. The high number of people working especially in agricultural sector is the reason of low ability of that sector to improve its competitiveness and performance. The only solution of current situation is to improve local infrastructure, human resources capital and the level of international investments. The result of transformation must be the growth of services sector role in regional economy and transformation of industrial sector (it is necessary to increase the share of industrial processing activities and to reduce the share of especially mining activities). Another step to improve African economy is the transformation of agricultural sector. It is necessary to reduce the number of people working agriculture and to make agricultural sector more productive. It is also necessary to encourage the growth of food processing capacities.

On the base of mentioned facts, for the future it is possible to expect the significant reduction of the agricultural share in the total GDP. It is also possible to expect increasing role of processing industry and especially services in a regional

GDP formation (both in relation to GDP total value and its structure as well as in relation to labor market formation). International trade may be named as another important factor which will have a significant impact on Sub-Saharan

economic development. Growth of inter-regional and especially intra-regional trade has a potential to stimulate development of African economy and its restructuring.

## SUMMARY

Sub-Saharan Africa is one of the most specific regions within the world economy. Its history, economy, social and cultural structure and development are influenced by long term colonization, regional instability and local and international policy. Structure of economy and population are completely different in relation to other regions around the world. The problem of Sub-Saharan Africa is high inter-annual population growth rate, post-colonial economy structure, limited economy performance and ability to generate sufficient number of job opportunities and added value, low level of intra-regional cooperation and low level of economy and social infrastructure. The paper aims to analyze main changes which have occurred in the GDP formation and structure in selected Sub-Saharan countries; changes are analyzed both in relation to total value and on a per capita basis. The idea is to identify main development trends of the Sub-Saharan region and differences among individual Sub-Saharan countries with the aim to determine particular groups of Sub-Saharan countries according to their economic structure. The paper analyzes GDP of African countries, its structure and development, covering the period 1990–2011. The GDP analysis is conducted in USD, both in current and constant prices (2005). Main data sources have been provided by the World Bank (WDI database). Because of limited data availability, there were selected about forty countries located in sub-Sahara and North Africa. The total GDP and GDP/cap value and structure of selected countries has been analyzed from three different perspectives: agricultural, industrial and services sector' value development. The mutual relationship between the total GDP and its particular components has been analyzed using the methods of correlation and elasticity analysis and the analysis of inter-annual growth rate, basic and chain indices. All calculations are conducted in Microsoft Office Excel 2010. The paper is based on Holub's methodology. The mentioned typology provides a very simple, but realistic overview of problems of Sub-Saharan economy formation. The analysis is confirming the fact that the Sub-Saharan Africa represents poor region. If we compare its GDP and GDP per capita performance to world or developed countries GDP and GDP/cap performance, we find out that Sub-Saharan Africa is far from usual standards. Despite of low value of economy performance, it is necessary to highlight the fact that Sub-Saharan inter-annual GDP growth rate is much higher in comparison to the world average, on the other hand its GDP/cap inter-annual growth rate is significantly under the world average. Another remarkable fact is the quite specific structure of the Sub-Saharan economy. The whole region is characterized by high importance of agriculture and industry within the total economy (much more than it is typical for the world economy). On the other hand, the service sector is still not fully developed. When analyzing differences which exist among Sub-Saharan countries, they appear distinct in their GDP, especially in per capita expression. Many countries within the surveyed sample reach their GDP per capita in the range from 1.000 and 12.000 USD a year (22 from 43 countries), but there are also many countries (21 from 43), where the GDP per capita reaches a value just from 245 to 900 USD a year. However the majority of countries already reached SIA or SAI model, still it is not possible to consider them as economies able to compete to the rest of the world. The huge differences existing among individual countries' economy are result of specific historical, political, cultural and social consequences. The main problem of Sub-Saharan economy development is low level of infrastructure, low level of investments and international subsidies and aid. Low level of industry and services sector's share in total GDP value development is a barrier for economy transformation. Both sectors are not able to generate enough job opportunities and many people do not have any other possibility than to work in primary sector or to be unemployed. The high number of people working especially in agricultural sector is the reason of low ability of that sector to improve its competitiveness and performance. The only solution of current situation is to improve local infrastructure, human resources capital and the level of international investments. The result of transformation must be the growth of services sector role in regional economy and transformation of industrial sector. Another step to improve African economy is the transformation of agricultural sector. It is necessary to reduce the number of people working agriculture and to make agricultural sector more productive. It is also necessary to encourage the growth of food processing capacities.



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## REFERENCES

- AHMED, A. D., SUARDIT, S. 2007. Sources of economic growth and technology transfer in Sub-Saharan Africa. *South African journal of economics*, 75(2): 159–178.
- AJAKAIYE, O., NCUBE, M. 2010. Infrastructure and Economic Development in Africa: An Overview. *Journal of African economics*, 19(1): 103–112.
- AJAKAIYE, O., NCUBE, M., MACAKIAGE, J. 2007. Services and economic development in Africa: An overview. *Journal of African economics*, 16, 1: 3–12.
- ANDERSON, K., MARTIN, W., MENSBRUGGHE, D. VAN DER. 2006. Would multilateral trade reform benefit Sub-Saharan Africans? *Journal of African economics*, 15(4): 626–670.
- BARBIER, E. B. 2010. Corruption and the Political Economy of Resource-Based Development: A Comparison of Asia and Sub-Saharan Africa. *Environmental & Resource economics*, 46(4): 511–537.
- BEZEMER, D., JONG-A-PIN, R. 2013. Democracy, globalization and ethnic violence. *Journal of comparative economics*, 41(Special Issue: SI): 108–125.
- BUSSMANN, M., SCHNEIDER, G., WIESE-HOMEIER, N. 2005. Foreign economic liberalization and peace: The case of Sub-Saharan Africa. *European journal of international relations*, 11(4): 551–579.
- COLLIER, P., VICENTE, P. C. 2012. Violence, bribery, and fraud: the political economy of elections in Sub-Saharan Africa. *Public choice*, 153(1–2): 117–147.
- EZEH, A. C., BONGAARTS, J., MBERU, B. 2012. Global population trends and policy options. *Lancet*, 380(9837): 142–148.
- GO, D., NIKITIN, D., WANG, X. et al. 2007. Poverty and inequality in Sub-Saharan Africa: Literature survey and empirical assessment. *Annals of economics and finance*, 8(2): 251–300.
- HENLEY, D. 2012. The Agrarian Roots of Industrial Growth: Rural Development in South-East Asia and Sub-Saharan Africa. *Development policy review*, 30(Special Issue: SI): S25–S47.
- HOLUB, A. 1970. A Brief Review of Structural Development in Developing ECAFE Countries. *Economic Bulletin for Asia and the Far East*, 11(1–2): 4–9.
- JENICEK, V. 2010a. Population problem in the future – challenges, questions. *Agricultural economics*, 56(3): 97–107.
- JENICEK, V. 2010b. World population – development, transition. *Agricultural economics – Zemedelska ekonomika*, 56(1): 1–15.
- JOHNSON, R. 2005. Agriculture and trade in Sub-Saharan Africa – A review. *Outlook on agriculture*, 34(2): 71–76.
- KINGDON, G., SANDEFUR, J., TEAL, F. 2006. Labour market flexibility, wages and incomes in Sub-Saharan Africa in the 1990s. *African development review-Revue Africaine de developpement*, 18(3): 392–427.
- KIRKPATRICK, C., WATANABE, M. 2005. Regional trade in Sub-Saharan Africa: An analysis of East African trade cooperation, 1970–2001. *Manchester school*, 73(2): 141–164.
- MWABU, G., THORBECKE, E. 2004. Rural development, growth and poverty in Africa. *Journal of African economics*, 13(1): 16–65.
- NDULU, B. J. 2006. Infrastructure, regional integration and growth in Sub-Saharan Africa: Dealing with the disadvantages of geography and sovereign fragmentation. *Journal of African economics*, 15(2): 212–244.
- REZEK, J. P., CAMPBELL, R. C., ROGERS, K. E. 2011. Assessing Total Factor Productivity Growth in Sub-Saharan African Agriculture. *Journal of agricultural economics*, 62(2): 357–374.
- TEKLE, K. A., KAMEYAMA, H., ITO, S. et al. 2008. Impacts of free trade area (FTA) within Eastern and Southern Africa countries and unilateral tariff elimination by other regions. *Journal of food agriculture & environment*, 6(2): 426–431.
- THIES, C. G. 2007. The political economy of state building in Sub-Saharan Africa. *Journal of politics*, 69(3): 716–731.
- THORBECKE, E. 2013. The Interrelationship Linking Growth, Inequality and Poverty in Sub-Saharan Africa. *Journal of African economics*, 22(1): 15–48.
- TIFFEN, M. 2003. Transition in Sub-Saharan Africa: Agriculture, urbanization and income growth. *World development*, 31(8): 1343–1366.
- WORLD BANK. 2014. WDI database. [online]. Available on: <http://databank.worldbank.org/data/views/variableSelection/selectvariables.aspx?source=world-developmentindicators>. [Access: 08/03/2014].
- WTO. 2014. International Trade Statistics. [online]. Available on: [http://wto.org/english/res\\_e/statistics\\_e/its2013\\_e/its2013\\_e.pdf](http://wto.org/english/res_e/statistics_e/its2013_e/its2013_e.pdf). [Access: 08/08/2014].

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