

# DOCTORAL (PhD) DISSERTATION

Yahya Z. Alshehhi

Debrecen

2018

**UNIVERSITY OF DEBRECEN**  
**FACULTY OF ECONOMICS AND BUSINESS**  
Institute of Sectoral Economics and Methodology

**KÁROLY IHRIG DOCTORAL SCHOOL OF MANAGEMENT AND  
BUSINESS ADMINISTRATION**

*Head of the Doctoral School:* **Prof. Dr. József Popp, university professor, DSc**

**DEVELOPMENT AND PROSPECT: AN ECONOMIC GROWTH  
ACCOUNTING OF UAE**

*Prepared by:*

**Yahya Z. Alshehhi**

*Supervisor:*

**Prof. Dr. Jozsef Popp**

University Professor, the head of doctoral school

**DEBRECEN**

**2017**

[Type here]

**DEVELOPMENT EFFORT AND PROSPECT GIVING: AN ECONOMIC GROWTH  
ACCOUNTING OF the UAE**

The aim of this dissertation is to obtain a doctoral (PhD) degree  
in the scientific field of “Management and Business Administration”

Written by: Yahya Z. Alshehhi ..... certified .....

**Doctoral final exam committee:**

	name	academic degree
Chair:	.....	.....
Members:	.....	.....
	.....	.....
	.....	.....

**Date of the doctoral final exam:** 20.....

**Reviewers of the Dissertation:**

	name, academic degree	signature
.....	.....	.....
.....	.....	.....

**Review committee:**

	name, academic degree	signature
Chair:	.....	.....
Secretary:	.....	.....
Members:	.....	.....
	.....	.....
	.....	.....
	.....	.....
	.....	.....

**Date of doctoral theses defence: 201**

[Type here]

## DECLARATION

I, undersigned (name: **Yahya Zakaeryya Hasan Alshehhi**, date of birth: 13/02/1972) declare under penalty of perjury and certify with my signature that the dissertation I submitted in order to obtain doctoral (PhD) degree is entirely my own work.

Furthermore, I declare the following:

- I examined the Code of the Károly Ihrig Doctoral School of Management and Business Administration and I acknowledge the points laid down in the code as mandatory;
- I handled the technical literature sources used in my dissertation fairly and I conformed to the provisions and stipulations related to the dissertation;
- I indicated the original source of other authors' unpublished thoughts and data in the references section in a complete and correct way in consideration of the prevailing copyright protection rules;
- No dissertation which is fully or partly identical to the present dissertation was submitted to any other university or doctoral school for the purpose of obtaining a PhD degree.

Debrecen, 14/11/2017.

***Yahya Alshehhi***

-----  
Name

signature

[Type here]

## TABLE OF CONTENTS

<b>INTRODUCTION</b>	<b>5</b>
<b>1 TOPICS AND OBJECTIVES</b>	<b>8</b>
1.1 AIMS OF THE RESEARCH .....	8
1.2 OBJECTIVE OF THE RESEARCH.....	8
1.3 STRUCTURE OF THE RESEARCH.....	8
1.4 RESEARCH APPROACH .....	9
1.5 RESEARCH HYPOTHESES .....	9
1.6 DISSERTATION CHAPTERS.....	10
1.7 ETHICAL CONSIDERATIONS .....	10
<b>2 TECHNICAL LITERATURE REVIEW</b>	<b>11</b>
2.1 ECONOMIC GROWTH .....	11
2.1.1 DEFINITION	11
2.2 ECONOMIC GROWTH THEORIES AND MODELS .....	12
2.2.1 CLASSICAL GROWTH THEORIES	13
2.2.2 KEYNESIAN GROWTH THEORIES	14
2.2.3 NEOCLASSICAL GROWTH THEORIES	15
2.2.4 MODERN GROWTH THEORIES	16
2.2.5 ECONOMIC GROWTH MODELS	17
2.3 SOURCE OF ECONOMIC GROWTH .....	21
2.4 THE MEASUREMENT OF ECONOMIC GROWTH .....	23
2.5 EMPIRICAL STUDIES SELECTED IN THE SOURCES OF GROWTH.....	24
2.6 ECONOMIC DEVELOPMENT .....	26
2.6.1 DEFINITION	26
2.6.2 HUMAN DEVELOPMENT (HD)	28
2.6.3 THE MEASUREMENT OF HUMAN DEVELOPMENT (HD)	31
2.7 ECONOMIC GROWTH AND HUMAN DEVELOPMENT (HD).....	35
2.8 ECONOMIC GROWTH AND ECONOMIC DEVELOPMENT .....	36
2.9 THE ROLE OF ECONOMIC SECTORS.....	37
2.9.1 PRIMARY SECTOR	38
2.9.2 SECONDARY SECTOR	39
2.9.3 TERTIARY SECTOR	39
2.10 PRODUCTION.....	40
2.11 PRODUCTIVITY .....	41
2.11.1 ROLE OF THE GOVERNMENT AND TOTAL PRODUCTIVITY	42
2.11.2 ECONOMIC SECTOR'S PRODUCTIVITY	43
2.12 THE UNITED ARAB EMIRATES (UAE).....	44
2.12.1 THE UAE'S GDP STRUCTURE	46
2.12.2 THE UAE'S LABOUR FORCE STRUCTURE	48
2.12.3 PRODUCTIVITY STUDIES	53
2.13 UAE AND THE GULF COUNTRIES.....	55
2.13.1 GCC'S GDP STRUCTURE	58
2.13.2 POPULATION STRUCTURE	60
2.13.3 GROSS CAPITAL FORMATION (GCF)	61
<b>3 MATERIAL AND METHODS</b>	<b>62</b>
3.1 RESEARCH METHODOLOGY .....	62
3.2 RESEARCH VARIABLES.....	64
3.2.1 INDEPENDENT VARIABLES	64
3.2.2 DEPENDENT VARIABLE	66
3.3 RESEARCH HYPOTHESES.....	66

[Type here]

<b>3.4 RESEARCH DATA SOURCE .....</b>	<b>67</b>
3.4.1 SOURCES OF DATA USING IN CAPABILITY APPROACH	67
3.4.2 SOURCES OF DATA USING IN SECTORAL APPROACH	68
3.4.3 SOURCES OF DATA USING IN INDUSTRY APPROACH	68
3.4.4 SOURCES OF DATA USING IN COUNTRY APPROACH	68
<b>3.5 RESEARCH THEORETICAL FRAMEWORK .....</b>	<b>69</b>
3.5.1 HUMAN DEVELOPMENT (CAPABILITY APPROACH)	69
3.5.2 GROWTH ACCOUNTING (SECTORAL APPROACH)	70
3.5.3 GROWTH ACCOUNTING (INDUSTRY APPROACH)	72
3.5.4 GROWTH ACCOUNTING (COUNTRY APPROACH)	73
<b>4 RESEARCH FINDINGS AND EVALUATION .....</b>	<b>75</b>
<b>4.1 EVALUATION OF HUMAN DEVELOPMENT PERFORMANCE. ....</b>	<b>75</b>
4.1.1 UAE IN THE ORDER OF THE HDI'S RANKING	75
4.1.2 UAE IN THE ORDER OF THE HDI'S VALUES	77
4.1.3 THE EVOLUTION OF THE HDI DIMENSIONS	78
4.1.4 GENDER DEVELOPMENT INDEX (GDI)	80
4.1.5 GENDER INEQUALITY INDEX (GII)	81
4.1.6 MULTIDIMENSIONAL POVERTY INDEX (MPI)	83
4.1.7 EDUCATION ACHIEVEMENTS	84
4.1.8 HEALTH OUTCOMES	85
<b>4.2 GROWTH ACCOUNTING OF SECTORAL APPROACH.....</b>	<b>88</b>
<b>4.3 GROWTH ACCOUNTING OF INDUSTRY APPROACH .....</b>	<b>92</b>
4.3.1 SECONDARY INDUSTRIES	92
4.3.2 TERTIARY INDUSTRIES	95
<b>4.4 GROWTH ACCOUNTING OF COUNTRY APPROACH.....</b>	<b>99</b>
<b>5 CONCLUSIONS AND RECOMMENDATIONS .....</b>	<b>103</b>
<b>5.1 CAPABILITY APPROACH .....</b>	<b>103</b>
<b>5.2 SECTORAL APPROACH.....</b>	<b>104</b>
<b>5.3 INDUSTRY APPROACH.....</b>	<b>105</b>
<b>5.4 COUNTRY APPROACH .....</b>	<b>106</b>
<b>5.5 RECOMMENDATIONS .....</b>	<b>107</b>
<b>6 MAIN CONCLUSIONS AND NOVEL FINDINGS OF THE RESEARCH .....</b>	<b>110</b>
<b>SUMMARY .....</b>	<b>113</b>
<b>REFERENCES .....</b>	<b>115</b>
<b>LIST OF PUBLICATIONS .....</b>	<b>127</b>
<b>LIST OF TABLES .....</b>	<b>128</b>
<b>LIST OF FIGURES .....</b>	<b>129</b>
<b>LIST OF EQUATIONS .....</b>	<b>130</b>
<b>ACKNOWLEDGMENTS .....</b>	<b>131</b>
<b>ATTACHMENTS .....</b>	<b>132</b>

[Type here]

## **INTRODUCTION**

Economic growth has always been a goal and a concern for all countries to pursue. Nevertheless, economic growth is a measure of increasing of a country's production in various goods and services over time. It is also one of the most important indicators of the country's economic activity; which is reflected in production capacity, per capita income and well-being (Acemoglu, 2008). Achieving high and sustainable economic growth rates is thus a key objective in the economic development plans of various countries, particularly developing countries. In light of this great importance of economic growth, economists in various schools and stages of economic thoughts were concerned with the subject of growth and interpretation of its occurrence, and knowledge of its determinants. As a result of these ongoing theoretical and applied research efforts, many economic theories have emerged over time.

The importance of economic growth and its influence on the respective country and people can be determined by the following points (Helpman, 2009):

- Increased individual income and thus improved lives of citizens (increased welfare of citizens).
- Meeting citizens' need of goods produced by the state and covering the needs of citizens as much as possible (access to self-sufficiency)
- Increased State's income in terms of surplus goods. There is achieved state security and safety due to availability of jobs, good income and coverage of citizens' requirements.
- Attempts of reconciliation of the layers of the society so that the poor can work and improve the standard of living and thereafter provide opportunities for entrepreneurs to set up businesses.

The Studies have shown an integrative relationship between economic growth, economic development and individual well-being. Well-being is achieved only through sustainable development and sustainable economic growth. Continued economic growth is an integral part of the comprehensive development program, which increases national income and increases the average per capita income. There are, therefore, factors conducive to well-being, such as services, justice in income distribution, social indicators (individual freedom, level of health care, social protection and education), and a clean environment.

Economic growth has a definition of being the rise in the services and goods' amount from a given country which have been produced using the main production factors (Helpman, 2009). Thus, the growth in national income per head is achieved solitarily by increasing the

[Type here]

growth rate of total national income over the rate of increase in population. The average per capita income must be increased over the long term until the individual's standard of living improves.

Economic development involves a change in the structure of income distribution, a modification production organization, and also a change in the value of services and goods delivered to people; which can have a definition of being the procedure whereby there is occurrence of a continuous and comprehensive adjustment, accompanied by a growth in the actual income and a progress in distribution of the income among the poor (Nafziger, 2006). The development contains several elements:

- Inclusiveness: It is a comprehensive change that includes economic, cultural, political, social and moral aspects.
- Steady rise in average real income for a longer time, demonstrating that it is a long-standing procedure.
- Improved pro-poor income distribution, i.e., poverty reduction.

Thus, the above can be summed up to the fact that economic development is consistent with economic growth in terms of positive direction towards progress and development, both of which focus on the individual and society, and aims to comfort, enhance their well-being in various forms and ensure continuity.

The motive behind this research is that the UAE is a modern state that has managed to occupy an important economic position in the world, and that has been accomplished at the international and local levels of achievements in a short period since its establishment. Where the citizen was the focus of attention, the State was able to gain the confidence of the global community through its excellence in global indicators such as the Human Development Index. Therefore, the researcher felt the importance of studying the economic growth of the UAE in depth, through its economic structure and important economic sectors, which played an important role between 1990 and 2015. There is study of the level of human development, whereby the human development index represents a global standard for measuring the level of development in any country.

This study is an important scientific contribution to the studies on economic development and growth in the UAE. There is scarcity according to the knowledge of the author in this area, specifically the study of economic sectors, as shown in the paucity of data, especially in a long time series. The second is the study based on economic development and growth represented by the Human Development Index. Another important study was the important industries that contributed effectively to economic growth.

[Type here]

This study has provided a significant scientific contribution for the review period where economic sectors showed the importance of economic growth. On the other hand, industries that had a role in driving growth were shown. The study also did not ignore the role of development, its situation and how it links with the results of economic growth. Of course, the study came out with recommendations and suggestions to the decision maker. The study also examined the theoretical basis of the relationship between human development, economic growth, economic development, economic sectors or industries in terms of contribution and productivity in the development stage. Therefore, this study can provide some insight into these subjects. Future research, both theoretical and experimental, will be important.

[Type here]

## **1 TOPICS AND OBJECTIVES**

### **1.1 Aims of the research**

The dissertation focuses on the economic and development growth and prospect outcomes of the United Arab Emirates (UAE). Thus, the main purpose of this dissertation was to analyze the source of growth from 1990 to 2015 for the UAE through the methodology of growth accounting.

### **1.2 Objective of the research**

The objectives of the study are as follows:

- Analyze the reality of human development from 1990-2015.
- Analyze the source of growth through breakdown the economy in three major sectors from 1990 to 2015.
- Analyze the source of growth through economic industries from 1990 to 2015.
- Analyze the productivity and per capita productivity by comparing UAE and its neighboring countries (GCC) between 2001-2014.
- Draw conclusions and recommendations for policy makers.

### **1.3 Structure of the research**

The study used four approaches to implement the study objectives as shown below:

- Capability approach: Assess the status of human development (HD) and examined with productivity.
- Sectoral approach: decompose growth into three components of major economic sectors. Through, analyze the main contributor to economic growth.
- Industrial approach: decompose growth into three components of economic industries secondary sector and tertiary industries, through analyze the main contributor to sector's output.
- Country approach: comparing productivity and per capita productivity for UAE among Gulf Nations. Also, decompose the into three components of production inputs and production per capita for the UAE and neighbouring countries.

[Type here]

#### **1.4 Research approach**

As stated by Forzano & Gravette (2012), the research approach is the method that directs the researcher about the basics of conducting the research. The two universal research approaches preferred by researchers are the qualitative and the quantitative research method. This dissertation follows the quantitative descriptive theoretical analytical research approach using secondary data published by the World Bank, Gulf Statistics center, and the UAE statistics center.

The main feature of the quantitative research is that it provides a complete description and analysis of the subject without limiting the scope of the search. Secondary data from various reliable sources are used to achieve the objectives of this dissertation. The scope is limited to the United Arab Emirates and some countries for comparison analysis.

#### **1.5 Research Hypotheses**

The dissertation examines research hypotheses in each of the four approaches used in this study. These hypotheses formed such as in the capability approach, where according to Mustafa (2013), that high level of development corresponded positively with the total factor productivity (TFP) based on the Rostow's (1960) stage of development hypothesis.

In the sectoral approach, and according to Rostow (1990), Matsuyama (1992), and Nurkse (1991), that agricultural sector is the fundamental stage for economic growth, whereby hypothesis formed in this study that agricultural sector was an essential stage for the successful economic growth within the examined period. Also, in regards to capital accumulation that important factor for economic growth (Sharipov, 2015; Mankiw et al., 1992). and whether the secondary sector considered as an engine for economic growth (Fagerberg & Verspagen, 1999), also the tertiary sector considers the more productive than secondary sector because it helps to increase the productivity in terms of economic demand and supply (Young, 1928; Kaldor, 1966; Kaldor, 1967). The hypothesis formed that the secondary, and tertiary sectors increased due to capital accumulation.

In the industry approach, the study examined whether the diversification strategy in the case study was successful in reducing dependence on oil results. Therefore, the hypothesis formed that mining and quarrying industry had contributed significantly to the growth of the secondary sector from 1990 to 2015. Also, hypothesis formed in regards the tertiary industries that financial corporations industry increased due to the labour factor whereby had the highest contribution rate to the sector's output. In country approach, research hypothesis formed, whether the UAE was

[Type here]

more productive than the GCC nations measured in terms of average growth rate of TFP from 2001 to 2014.

## **1.6 Chapters of dissertation**

The study is composed of 6 chapters:

Chapter 1: Describes the subject, aims, objectives and approach of the study, ethical consideration, the field of study, the research hypotheses, the methodology and sections of the thesis.

Chapter 2: Contains a literature review related to the objectives of the dissertation such as an introduction of the UAE and Gulf nations. Also, included are microeconomic variables such as UAE's GDP, labour force structure, population structure, capital stock in the GCC, economic development, economic growth, economic and human development, importance of the economic sectors, production function, and productivity.

Chapter 3: Explains the theoretical framework of the four approaches used in this study such as the capability approach, the sectoral approach, the industry approach, and the country approach. Also, included is are the data sources, research hypotheses, and variables examined in-the study.

Chapter 4: Summarises the findings of the four empirical studies, namely the capability approach, the sectoral approach, the industry approach, and the country approach.

Chapter 5: Draws conclusions from the results and makes recommendations for policymakers.

Chapter 6: Presents the main results of the study.

At the end of the study, appendixes, list of figures, tables, and equations, list of publications, and references are enclosed.

## **1.7 Ethical considerations**

A study is the assembly of numerous processed and unprocessed views, opinions, facts, findings of a particular theme and hence it should be handled and maintained with care and secrecy. Ethics are the moral principles followed by the investigator in fulfilling the research rules. In this dissertation, the author maintained ethics by honestly sourcing the figures from reliable sources of the country statistics centres and international organizations. In addition, the novel findings are based on figures sourced.

[Type here]

## **2 TECHNICAL LITERATURE REVIEW**

### **2.1 Economic growth**

#### **2.1.1 Definition**

Economic growth is a quantitative concept to express increased production in the long term. Economic growth is known as an increase in the production of a country in the long term (Nafziger, 2006). As growth reflects the increase in production, it takes into account the growth of per capita income. According to the above, economic growth denotes (Barro & Sala-i-Martin, 2003):

- An increase in real gross domestic product (GDP) between two periods.
- An increase in GDP per capita income.

There is a connection between economic progress and population growth. If the national income growth is larger than the population growth rate, so the growth of the economy is in a better and an advanced position. If the national income growth rate and the population growth rate are equal, there is no economic growth, while the population growth rate is higher than the growth rate of the national income, so the economy is in a decline position. Economic growth is a necessary condition, but it is not enough to raise the standard of living of people and distribute the increase achieved, which is a related issue linked to the nature of economic and political systems in each country (Mankiw, 2009). Economic growth was defined as a long-term increase in the ability to increasingly provide increasingly diversified economic goods to the population, and an increasing ability based on progress and technology, institutions and ideological adjustments adopted (Kuznets, 1973). Thus, from this definition a variety of features are absorbed including:

- Focus on long-term growth, and hence sustainable growth rather than transit.
- The role of technology in long-term growth.
- There is a need for ideological institutional adaptation, which indicates the importance of the institutional system in the growth process.

Paul, Samuelson and William, Nordhaus in their book "Economics, 11th Ed", published in year 2012, defined that the economic growth represents the expansion of a country's potential GDP or national output. Economic growth includes a steady increase in the actual production of goods and services, as well as an increase in the economy's capacity to produce these goods and services (Peterson, 1984). Economic growth is the process through which an economy's production

[Type here]

possibility curve shifts outward (Rittenberg, 2011). According to Amartya Sen (1983), economic growth is as part of the economic development process.

The previous definitions highlight economic growth as the quantitative variable measuring the relative change in real output, a variable that reflects economic expansion, reflects real output associated with economic capacity and economic expansion, and a variable that measures wealth, particularly those that produce and distinguish between two types of growth. These are actual and potential growth which represents an increase in the country's productive capacity and increased capacity that helps to use part of unemployment and employment as well as part of the capital to achieve saturation (Burke, 2011). In addition, the increase is real and not symbolic and requires real change in technology and the institutional system. Therefore, the increase in real per capita income requires that the increase in average per capita income is greater than the rate of increase in the overall level of inflation (Miles & Scott, 2008).

In general, economic growth is still a prerequisite for an increase in the standard of living of a country's citizens, but not enough for prosperity. UN and contribution by economists have therefore developed development primarily for the goals of nations through the development of specific sectors such as education and health. Therefore, it has become a priority of economic policy. Therefore, the concept of development is broader than growth. First, it is a structural change in the production structure with the redistribution of necessary production elements between sectors. Second, it ensures a decent life for individuals. Finally, it ensures that this growth is sustained by ensuring that the remaining economic surplus continues to flow beyond the needs of individuals and the investment wave.

## **2.2 Economic growth theories and models**

The theory of economic growth seeks to study the factors of economic growth; and it can be seen that the theory of economic growth has gone through two main stages, taking into account the method of analysis used. Even the beginning of Keynes' theory was based on theoretical analysis of economic growth factors without using models to measure the impact of economic growth factors. These theories did not try to make an explanation of the connection between these factors and economic growth accurately, which mean the quantitative determination of the relationship between them. But after showing the importance of econometric analysis in economic analysis in particular, particularly by Keynes, which was considered the beginning of a new phase based on econometric analysis, some attempts have been made to build economic models, especially in the area of economic growth. The most prominent of these models are the Harrod-Domar model and the Solow-Swan, which are still evolving methods.

[Type here]

Therefore, there are many schools of thought that have been subjected to economic growth and tried to provide a comprehensive theoretical framework that can be followed by all countries to reach acceptable levels of economic performance, out of the cycle of underdevelopment and economic stagnation, which characterized many of them, where the shortcomings of the theory was the beginning of a new theory. Thus, described below are major theories such as classical theories, Keynesian theories, neoclassical theories, and modern theories according to their chronological order. In addition, there is the neoclassical theory - the concept of Solow growth model and how its application.

### **2.2.1 Classical growth theories**

It was a growth theory and income distribution between rents, wages, and profit concerns of most pioneer popular classic economic scholars such Adam Smith, David Ricardo, Thomas Malthus, and Karl Marx. A classical analysis was based on many hypotheses, notably competition and private property, the full use of resources, and individual freedom in economic activities (Sharipov, 2015; Barro & Sala-i-Martin, 2003).

According to Adam Smith, the division of labor is the reason for increased productivity, which is the source of wealth of nations, which contributes to increased production capacity and consequent increase in profits and savings and then reinvested in the accumulation of capital. Capital accumulation is the main driver of economic growth as it raises the level of production, leading to higher demand leading to higher living standards (Smith, 1776; Sharipov, 2015). Ricardo considered agriculture to be the most important economic sector in its contribution to the provision of food to the population, which is changing with decreasing yields. This means a decline in returns due to the constant of technology factor on the other hand. The distribution of income between the classes of society is the decisive and determining factor in the nature of economic growth (Ros, 2013; Nafziger, 2006; Mankiw, 2009). Maltos focused on the importance of the population in determining the demand for growth, where demand must grow proportionally to the production potential to maintain the level of profits. The Thomas Malthus in his book “An essay on the principle of population” in 1798 said that whatever the economic system of the state, people's standard of living would not be better if the population rise rate was higher than the economic growth rate (Mankiw, 2009; Malthus & Pullen, 1989). And, Marx's analysis of the performance of capitalism was a good attempt to understand the mechanics on which to base economic growth. One of the most important ideas of Marxism is the idea of value added (Barro & Sala-i-Martin, 2003).

[Type here]

The convergence of classical views in determining and achieving economic growth, and they are looking for long-term growth performance in national income, based on microeconomic analysis. Therefore, the main ideas were centered on different points (Mankiw, 2009). First, production is a function of a number of factors (land, labor, capital). Any change in production occurs through one or all factors. Agricultural land is the only fixed element in the model governed by the law of diminishing yields, which is subject to the constancy of factors. Second, a constancy of technological progress, which makes it a variable, does not affect the process of growth, which is contrary to contemporary theories that made it an influential element in the economic growth process. Third, there is the need for social and institutional factors conducive to growth. The classics emphasized the great importance of the social and institutional environment that helps economic growth. This environment is characterized by stable social and administrative laws, an efficient system of production and appropriate social conditions. Lastly, in the classical view, the end result of development is stagnation. This recession results from the natural inclination of profits to the decline and impact of capital accumulation.

As a summary of the classic school of economic growth, the decisive factor in economic growth is labor and capital. The increase in capital accumulation results in a rise in the rate of production. However, as an accumulation of capital grows and the population increases, factor productivity declines and therefore wages and profits fall. As a result, the per capita income trend towards recession is long term. The other corner point is that profit is the only source of savings; that expansion of the market is helping to expand the economy. The existence of appropriate social conditions forms the prerequisites for economic development. They believed that the capitalist system was doomed to stagnation.

### **2.2.2 Keynesian growth theories**

The classical theory lasted for several decades. The theory explained the various economic phenomena. However, there were no problems until the economic crisis, the great depression occurred and the classical theory failed to explain and address it. The great depression was characterized by stagnation in goods and services (supply exceeds demand), production stagnation and thus issues with the process of economic growth. There also were high levels of unemployment and low price levels. Thus, interest in the issue of economic growth began, especially through the revolution of Keynesian theory, an income theory led by J. Keynes (Palley, 1996).

The key element underlying Keynes' theory is that macroeconomics can be in a long-term imbalance. John Maynard Keynes's theory calls for the involvement of the government to aid in

[Type here]

Overcoming aggregate demand reduction in order to increase growth and decrease unemployment. The fundamentals of this theory that the recession occurs that savings exceeding investment, the decline in the rate of investments will lead to lower interest rates and thus lower savings rates and the increase in investments leads to a rebalancing of the macroeconomic and employment rates. So, the investment is the main factor of economic growth that raises the income (multiplier effect). According to Sharipov (2015), Keynes recommended the increase in demand for capital goods as follows:

- The State establishment of investment projects in order to reduce unemployment.
- The State reduction of the interest rate which encourages enterprises to borrow and make investments.
- Country prevention of monopoly and prevention of high prices of products as it can result in weakness in requesting of consumer goods and also reduces investments. When monopolies are eliminated, consumer prices rise (demand increases). Therefore, producers are encouraged to increase production capacity as well as to increase demand for machinery and investments needed for production.

As a summary, the Keynesian theory illustrates the possibility of economic equilibrium at a level below the full utilization level, which is determined by aggregate demand. The problems that permeate the capitalist system are not on the supply side, but because of insufficient effective demand. Since investment is a function of interest rate, saving is a function of income. The balance in production is stimulated when the planned investment is equal to planned savings. As a result, economists have had inspiration from the work of J.M. Keynes to study the opportunities of a balanced growth such as Domar and Harrod economic growth model as such opportunity that seeks to account for the conditions and the essential characteristics of the balance of a capitalist economy in growth.

### **2.2.3 Neoclassical growth theories**

This theory developed during the second half of the 1950s. The period of the capitalist economy has been characterized by high rates of balanced economic growth for varying periods, albeit relatively long. The hypotheses and foundation of this school as a result of the new realism of the capitalist economy has led to the thought of change. The previous intellectual trend (the Harrod-Domar model), which focused on the demand side as a decisive factor in economic growth, has been replaced by a new intellectual orientation that is intrinsically dependent on the supply side as a critical factor in growth and development. Hence, this new classic trend is referred to

[Type here]

as the (classical ideas on the supply side in the interpretation of growth and development). The neoclassical growth theories developed new mechanisms of economic growth that gave up the stalemate and weak range of classical ideas, in particular, the technological factor and innovations in the process of production (Sharipov, 2015; Nafziger, 2006).

The neoclassical theory has brought many changes to the ideas and principles of classical theory. Perhaps the most important classical ideas that have been updated include:

- The traditional correlation between income distribution and savings in the economy.
- That technological progress increases the level of capital.
- The size of a population, size of capital and the level of technological progress, which affect the rate of economic growth, are determined by forces outside the field of economics.
- Focus on short-term problems reflects the classical theory that focuses on the long term.
- The size of the population does not change with the change in per capita income.

#### **2.2.4 Modern growth theories**

Although the growth of the theory of the neoclassical theory holds that the main source of growth is technological progress, but it does not explain in what ways such technological development can be achieved (Acemoglu, 2008; Sengupta, 2011). Despite that technological development is one of the most important elements of the factors of production that grows at a spontaneous rate (Exogenous rate). Therefore, this interpretation of the theory is not convincing because the neoclassical theory ultimately sees that the ultimate source of growth cannot be explained. Due to this, after the mid-1980s of the last century, economists began to move away from the neoclassical theory defaults in an attempt to identify the main source of the growth process, and thus arose the so-called New Growth Theories or Endogenous Growth. And these modern theories see that there are several sources of growth, and they are similar to those previously referenced in the neoclassical theory, but with some differences (Ros, 2013).

In terms of labour, the modern theory says that labour productivity can be achieved by investing in human resource, by acquiring more skills and experience (Olivier & David, 2013). This is done through the education process primarily, or outside the education system. The theory also believes that the law of diminishing returns can be overcome, which is illustrated by the neoclassical model theory through investment in both labour force and capital in parallel (Romer, 1989; Solow, 1999). The modern theory does not use the term (Labour), instead, it uses the term (Human Capital). The workforce is needed for investments, and it increases in value like the capital altogether. This

[Type here]

theory posits that human capital is considered as the wealth of nations, where investment will expand by increasing the capacity, the skills, and expertise of its members (Jones, 2015).

On the other hand, with regard to TFP and the focus on the technology, modern theories of growth sees that technological development combined with high fixed costs are called research and development costs (Romer, 2001). Thus, companies will not provide for such products while working under imperfect competition. According to the neoclassical theory, all companies operate under full competition (Greiner, 2010). Thus, economists believe that legislation and laws protect the intellectual property, and patents are very important means of encouraging companies to innovate and renew (Todaro & Smith, 2015).

Governments are trying to find a balance between encouraging innovation and reducing monopoly. The protection of the inventor or innovative companies should not be limited to the local level, but they should be extended on the global level as well (Grossman & Helpman, 1993). An international protection for patents and intellectual property is needed, which is one of the most important goals of the World Trade Organization (WTO).

In general, economists also look at the modern growth theories to study the role of government in influencing economic growth rates as one of the most important and most powerful economic players in any economy, and then the actions have an effect on the importance and strong performance ratios in any economy (Barro & Sala-i-Martin, 2003; Salas, 2007).

### **2.2.5 Economic growth models**

Classic theory has analyzed economic issues on the perspective of long-term. The Keynesian theory has focused on the analysis of economic phenomena from the perspective of the short-term (Sharipov, 2015). However, it has expanded the area of interest in the issue of economic growth from short-term to long-term because of the following:

- Economic crises in industrialized countries of the post-World War II.
- The growth of the socialist system, and the talent to solve economic problems.
- The problem of economic development in developing countries.

As a result of these factors, a new phase, known as the “stage of growth models”, which gave the time dimension of the importance in the analysis of the economic phenomenon can divide these models such as Keynesian models, neoclassical models (exogenous models), and modern models (endogenous models). Keynesian literature has known several models such as Harrod-Domar (1939-1947) and Kaldor Robinson (1963). The neoclassical growth models consist of various models such Solow-Swan (1956) which is also called the Solow model and Ramsey or

[Type here]

Cass-Koopman (1965). The third stage of growth modeling is the endogenous growth models which consist of several models such as Romer model (1986), Lucas model (1988), Romer model (1990), Barro model (1990), AK model (1991), and Mankiw or MRW model (1992).

The neoclassical - Solow model that will be used in this study, has been developed successively by Ramsey (1928), Solow (1956), Swan (1956), Cass (1965) and Koopmans (1965). This Solow model is an extension of the Harrod-Domar model, which focuses jointly on the importance of saving and investing as a fundamental determinant of the process of capital accumulation and hence economic growth.

However, Solow adds other factors of production to his model, labour and technological progress (Garfield, 1987). In contrast to the Harrod-Domar model, Solow assumes that the law of diminishing returns decreases separately for both the labor and capital in the short term and the assumption that yields of the two components are stable in the long run in order to determine the impact of the technology on growth. The level of technology at Solow is determined outside the framework of the model and is independent of the other factors (Solow, 1956). According to this model, growth in GDP is due to one or more of the following reasons:

- An increase in the quantity or quality of the labor through the development of education or population.
- A rise in capital due to investment and savings.
- Development on the technological level.

According to this model, when the domestic savings rate rises, the investment improves, leading to an increase in capital accumulation and thus an increase in GDP growth. However, this mechanism is better achieved in economies where capital flows and foreign investments are increasing, compared to those closed economies where the rate of investment is limited to local savings, which are low due to low incomes (Solow, 1956).

According to the neoclassical theory - solow model, the primary components of the production process are capital and labour, and the secondary component is technology and knowledge **Hiba! A hivatkozási forrás nem található.**(Figure 15). These elements are basic inputs to outputs like goods and services (Sala-i-Martin, 2002; Romer, 2001).

[Type here]



**Figure 1. Production factors**

Source: (Barro & Sala-i-Martin, 2003)

These inputs can be capital input including all physical inputs such as machines, land, buildings, and etc., where the symbol ( $K$ ) indicates physical capital. Labour input involves labour force, working hours produced, or the number of workers within society contributing to the production process, where the degree of skill and productivity of workers vary from one individual to another. Thus, the improvement of the employees' productivity can be achieved through investment in the employees - in Human Capital - to increase their skills and knowledge. Human resource investment takes several forms, mainly in health and education. The symbol ( $L$ ) is used to indicate labour. Knowledge or Technology are considered the third input in the production process and are used for the adaptation and development of capital and labour and to produce output, where this input is symbolised by ( $A$ ). Therefore, the potential output of an economy can be determined by the following equation:

$$Y = A.F(K,L)$$

**Equation 1**

According to Solow, the function of production ( $F$ ) with the specific characteristics that the economy can achieve a steady growth rate with an appropriate amount of factors of production (labor, capital and TFP), as well as changes in capital and labor economy can achieve a state of equilibrium, as TFP affects the economy and economic growth can not continue without progress in technology (Solow, 1956). The function depends on two assumptions. The first being that production function has constant return to scale, which increases rate in the sense that the doubling of capital and labour is expected to double the production output accordingly. The second assumption is that production function is subjected to what is known the law of diminishing marginal productivity of either capital or labour, where both are positive and diminishing. For example, if you add one unit of capital, for example a machine, without the addition of any new labour, the impact of this machine on the production will depend on the size of the initial capital available less than desired or to a greater extent, the increase of capital will have a significant impact on production, or vice versa (Sobel & Hall, 2007). One of the most well-known examples of a function of factors of production under the neoclassical theory is the Cobb-Douglas production function that used by Solow will be used in this study as follows:

[Type here]

$$Y_t = A_t K_t^\alpha L_t^{1-\alpha}$$

**Equation 2**

Where  $(\alpha)$  refers to the capital share, and  $(1 - \alpha)$  symbolizes the share of labour. According to this, the volume of production in an economy can increase in three cases: increase in capital, increases in labour, or improved technology. It must be noted, it does not symbolize only the technology, but it represents different variables which are known as Total Factor Productivity (TFP), or called “Solow residual” (Solow, 1957).

Production can increase if the increased capital stock ( $K$ ), as well as a range of factors (such as the level of technology, the level of education and training for individuals, or sound economic policies) create an atmosphere that helps to attract foreign investments. All these and other factors can contribute to increasing the productivity of the entire production, which we have referred to in the production function framework as  $(A)$ .

Solow considers that the economy cannot grow without an end through capital investment only (Mankiw et al., 1992). In other words, the growth in the economy by increasing the investment rate will achieve sustained growth in the long term, but with the growing increase in capital accumulation, the increase in the rate of growth will decrease and even fade completely according to the law of diminishing returns.

One of the important concepts that should be known of the neoclassical theory is known as convergence (Mankiw, 2009; Burda & Wyplosz, 2012). For example, if there are two countries, one is poor and the other one is rich, the country with the less capital accumulation would have the result of higher marginal capital accumulation because of the aforementioned law of diminishing returns. Thus, the poorer country is supposed to grow faster than the rich country assuming an increase in capital accumulation in each. In spite of this, the wealthier country can achieve a higher and faster growth rate than the poorer country if the increase in the rate of capital accumulation is larger, which means that the  $(K)$  in the richer country is higher than  $(K)$  in the poorer country (Ros, 2013). It should be noted that the capital increase rate requires high savings rates, and therefore instead of adapt on the absolute convergence hypothesis, which is based on the assumption that both countries having the same savings rates. Assumption conditional convergence hypothesis, which assume that the possibility of the existence of different rates in savings between the two countries (Barro et al., 1991; and Mankiw et al., 1992).

Now the question is what are the sources of growth which could explain the difference in the growth rates of one economy compared to another or one economic sector compared to another sector? In other words, why some economies grow bigger and faster than other economies? For example, we find that some economies can grow larger and faster than other economies, at least

[Type here]

within a certain period, by the increasing rates of savings and investment, as well as by the increase of labour (Barro & Sala-i-Martin, 2003). Nevertheless, the economies that pursue this path will face slow growth rates in the future because such increases either in the capital or labour will not be repeated at the same rate in the future with no end. But in spite of that, some economies can maintain a high growth rate through the improvement of the level of TFP (Garfield, 1987). The question posed here is how you can measure this variable given that TFP in itself cannot be measured. Therefore, we cannot measure the rate of growth in this variable directly. To illustrate this, and by reference to the previous Equation 2, we can put it in the following form:

$$\frac{\Delta Y}{Y} = \frac{\Delta A}{A} + a \cdot \frac{\Delta K}{K} + (1 - a) \cdot \frac{\Delta L}{L}$$

Equation 3

This means that the rate of growth in the GDP or the aggregate output can be determined by three components: the rate of growth in total factor productivity, the growth rate in the capital formation, and the rate of growth in labour (Andolfatto, 2008; Crafts, 2009). The problem here is that all the components of Equation 3 can be measured with the exception of the rate of growth in TFP, and to overcome this, the equation can be re-formulated to measure the rate of growth in this variable as follows:

$$\frac{\Delta A}{YA} = \frac{\Delta Y}{AY} - a \cdot \frac{\Delta K}{K} - (1 - a) \cdot \frac{\Delta L}{L}$$

Equation 4

This means that the rate of growth in TFP can be measured by the remaining difference between the rate of growth in GDP (output) on the one hand, and the rate of growth in both capital and labour on the other hand as presented in Equation 4.

## 2.3 Source of economic growth

Economists cite several factors and they make it a basis for economic growth, but they differ in their views on the relative importance of these factors (Barr, 1996).

### 2.3.1.1 *The quantity and quality of human resources*

Human resources represent the most important factor of economic growth, especially in the past (in the classic school), as they considered it an essential specific factor of production (Harbison, 1973). However, the development of technology and technical progress has become a factor of labour linked to the increased skills, education, and training. Training and education of workers, which is considered as the type of the investment in the training of employment to give us human capital. There is no doubt that the two elements (education and training) help to raise the

[Type here]

productivity of the workforce (Barro et al., 1991). Another perspective about human resource is that economic growth does not only mean an increase in the GDP but must consequently increase in real per capita income in the sense that growth must be higher than the population growth rate (Barr, 1996).

#### *2.3.1.2 The quantity and quality of natural resources*

Usually, an economy's production is based on the quantity and quality of natural resources possessed by size of agricultural area, available natural resources such as oil, gas, water, minerals, and forests. However, these natural resources will be worthless if not exploited by human resource rationally to achieve economic and social objectives (Miles et al., 2012). In the world we see many countries harness the diverse abundance of natural resources and rank among the underdeveloped countries, however, it should be noted that these natural resources are static and often limited. Thus, the human resource should develop and discover new resources to increase economic growth.

#### *2.3.1.3 Accumulation of capital*

Capital is the substance used in the production of other commodities that represent capital investments (Todaro & Smith, 2005). Capital accumulation in a society is the amount of what the economy owns of capital goods such as buildings, production enterprises, plants, machinery and equipment, roads and public transportation, bridges, schools and universities, hospitals, and economic infrastructures etc. Those that offer the necessary environment for the economic projects and increase the generative capacity of the country. Capital accumulation increases physical stock for the community through deducting part of its income through savings (i.e. non-consumption), and then converting these savings to physical capital through investments to help increase the country's production (Ros, 2013). Thus, the increase of capital accumulation has a positive impact on the economic growth.

#### *2.3.1.4 Technological progress*

Technological progress is the intended change in the situation as a result of scientific inventions and scientific discoveries that can be applied in economic terms and may be used in mass production at a reasonable cost commensurate with the level prevailing or purchasing power in the community prices. The introduction of new technical methods in the production process will help performance improvement than the increase in the capital of economic growth. The new technology means many things, such as new inventions, new technical methods of production, improvement in management and administration, improvements in the training and qualification systems (Todaro & Smith, 2005). Therefore, they are called total factor productivity (TFP). Thus,

[Type here]

the technology considered means the optimum use of factors of production in the production process.

### 2.3.1.5 Environmental factors

Economic growth requires encouraging climate conditions and appropriate social and economic environment as well (Barro et al., 1991). Also, a banking system facilitates growth, taxation system encourages investments, legal system works on business foundations, and political stability rules and supports economic growth (Soubotina, 2004). The political stability in some developed countries achieved high growth rates despite the lack of natural resources.

## 2.4 The measurement of economic growth

Economic growth is defined as a steady increase in the actual production of goods and services, in order to increase the economy's ability to produce these goods and services (Peterson, 2011). Also, it is known as an increase in the production of the country in the long-term (Nafziger, 2006). GDP is the best indicator for measuring economic activity because it determines the value of goods and services produced by an economy over a certain period of time, often one year (Callen, 2008). GDP is referred as the total production of any economy (Page & Norman, 2014), it is commonly used as an indicator to indicate the health of the country's economy in monetary value as well as the gauge of a country's standard of living (Wesselink et al., 2007). Therefore, GDP is considered as broad measurements that measure overall economic activities. As described in the equation below, the GDP includes consumption (C), investment (I), government expenditure (G), and exports minus imports (X-M), transactions that occur within the country (Eucken, 2012).

$$GDP = C + I + G + (X - M)$$

Equation 5

The GDP growth rate can be nominal that is expressed in market value or real term, which is adjusted for changes in the prices (deducted from inflation rate) (Miles & Scott, 2008). Thus, economic growth is measured by an annual economic growth expressed in the formula below:

$$\text{Economic growth (\%)} = \frac{GDP_{\text{current}} - GDP_{\text{previous}}}{GDP_{\text{previous}}} \times 100$$

Equation 6

Economic growth is measured by the total output produced within the country (Peterson, 1984). Therefore, the government of any country tries to accelerate the output rate for several reasons. First, higher GDP growth means that the economy is creating more goods and services, and if this growth is linked to the consumption, people can enjoy the prosperity and welfare of the society. Second, with higher GDP the government of the country channels more expenditure toward public

[Type here]

services and investment in the country's main sectors (Mankiw, 2009). Therefore, higher GDP growth will contribute to raising the demand for labour and in return, the unemployment will fall and be balanced (Todaro & Smith, 2015). From the other side, it is necessary to clarify that the use of GDP is not a consensus due to some of its shortcomings (Sharpe, 1999; Costanza, et al., 2009; Jacobs & Slaus, 2010; Sengupta, 2011; Costanza, et al., 2014; Jones, 2015):

- The GDP doesn't differentiate between the distribution of products in a fair or unfairly pattern.
- The GDP does not take into account increased working hours.
- GDP does not take into account other market activities, such as the production of products and services in the informal economy, given the difficult growth of the large proportion of the economies of many countries. A great value for goods and services is not reflected in the value of GDP as a measure of economic growth.
- The GDP does not take into account non-monetary factors such as the environment, political openness, cultural change, and the role of national and international societies.
- GDP neglect the demographic growth.

These shortcomings described are the conflicting points in the use of the GDP as a key tool for highlighting economic growth by some parties of the economy. Other indicators of economic growth are labour productivity growth, the Human Development Index, the Environmental Footprint, and the Happy Planet Index (HBI) (Sharpe, 1999). Thus, after presenting the advantages and disadvantages of this tool, the GDP is used in this study as the output variable referring to production for the whole economy and sectors as well.

## **2.5 Empirical studies selected in the sources of growth**

Based on the analysis of the Solow model many empirical studies attempted to analyse the phenomenon of economic growth through a growth accounting framework. There is a considerable impact on the economic growth in the developed and developing countries due to different factors of production.

According to Tinbergen (1956) productivity was found to be about 27% of the US productivity performance during the period between 1870-1914. During the period 1948-1979, three quarters of economic growth in the US was attributed to capital and labour inputs, one quarter of which was due to productivity growth (Jorgenson, 1988). Abramovitz (1956) and Solow (1957) placed a greater focus on the economic growth due to TFP from the inputs of capital and labour sources.

[Type here]

Some studies suggest that other factors such as the quality of labour, education, health and others affect the productivity of the economy and of the workers (Arshad & Ab, 2015; Jajri & Ismail, 2010; Ozturk, 2001; Forbes, Barker & Turner, 2010; Bloom, Canning & Sevilla, 2004; Rain, 2004).

Denison (1985) showed that in the US human capital (education, training, knowledge, economy peaceful, and health) in workforce plays a significant role in the overall productivity of the factors of production. Accordingly, the US achieved an average annual economic growth of 3.1% during the period between 1929 to 1982, 25% of the economic growth was due to increasing labour inputs with constant education qualification, 12% was due to capital inputs, and the rest was due to technical progress expressed in human capital outputs and just a minor contribution came from the traditional production factors, labour and capital (Denison, 2011).

When comparing countries with each other, it can be easily assessed that the educational indicators and economic indicators evolve together, whether positively or negatively. Sala-i-Martin (1997) identified in his study many variables influential on the rate of economic growth, among those policy variables, such as the quality of the government, the role of law and property rights, factors related to investment growth, the adoption of raw materials in the export process, the degree of economic openness of the country, the level of education in the country. Also listed are the availability of relative stability in the macro-economic variables such as inflation, fluctuations in exchange rates, and the budget deficit.

The growth in East Asia since 1960s has been due to the physical capital, human capital, or labour inputs with little contribution to TFP (Fischer, 1993; Marti, 1996; Singh & Trieu, 1999; Hayami & Ogasawara, 1999; Sonobe & Otsuka, 2001; Young, 1994; Kim & Lau, 1994). By contrast, the source of growth specifically in some developed countries such as West Germany, France, United Kingdom, Japan, and United States was mostly due to technical progress.

In a study Bosworth & Collins (2003) analysed 84 countries over four periods from 1960 to 2000. The results showed that the miracle achieved by the East Asian countries during the period from 1970 to 1980 and from 1980 to 1986 was mainly due to an increase in savings and capital accumulation rates, which may be in conflict with the theoretical background stating that technological progress plays a fundamental role specified in economic growth. In the long term, however, if these countries focus on the capital accumulation to achieve high growth rates, the law of diminishing returns will begin to work and would contradict the growth rate until it completely fades (Young, 1994).

[Type here]

Studies find that some countries such as Singapore achieved an average yearly growth rate of 7.4% between 1986-1992, and note that only 2.6% of this growth is due to the accumulation of capital, and 0.6% accounts for education and the rest is attributable to increased technology. Therefore, in the long term, it is necessary to improve the level of technology used to keep up high growth rates. Almost the same results are applicable to most of the East Asian countries, where the growth rates during the period 1986-1992 were due to the increased progress rate of technology, the low or declining growth rates often accompanied by a decline in rates of technological progress.

In a study about the determinants of growth in many economies (about 100 countries), Barro (1991) explained that there are many variables with the moral effect influencing the rate of growth in the long term such as the level of education, investment, political stability, and the initial level of income. A study on the source of growth in developing countries by the IMF (2000) found that about 60-70% of per capita growth was explained by capital accumulation, out of this 10-20% was due to human capital and the rest came from the improvement in TFP (Lakhera, 2016). A study about the role of productivity in China's economic growth from 1981-1997 by applying the Solow approach noted that the contribution of TFP achieved an average of 13.5% between year 1982 to 1997 (Wu, 2003). An empirical study for OECD countries from 1970-1997 found that the human capital and accumulation of physical capital were the main drivers of economic growth (Bassanini & Scarpetta, 2002).

After a review of the factors affecting the economic growth, it can be concluded that there are many factors influencing the growth rate of a nation or region but they are still mostly related to human capacity and behaviour in order to increase the productivity or the way humans are trained to produce and think.

## **2.6 Economic Development**

### **2.6.1 Definition**

When economists, researchers address the issues of underdevelopment and economic growth, they often raise the issue of the difference between economic development concept and economic growth concept. There is no agreement among economists in the determination of the concept of economic development but they agree that economic development includes all aspects of life in the society (Nafziger, 2006). However, it is important to address economic development because economic growth helps to achieve sustainable economic development considered as a strategic goal of any nation in order to achieve prosperity (Burke, 2011).

[Type here]

Development is a process of increased national income and per capita income on average, which results in achieving high rates of growth in certain sectors that reflect the progress of development (Baldwin & Meier, 1957). Rostow (1960), considered development as a process whereby societies leave their traditional characteristics and adopt the prevailing characteristics of the developed communities (Ranis & Fei, 1961). According to another definition, economic development is an increase in the gross national product in a certain period to meet the needs of technological changes, regulatory frameworks in the institutions of existing production (Kindleberger, 1965). Another definition of economic development is related to increasing real income per head or enhancing potential factors to bring on such high income (Robbins, 1968). Economic development is a process which ensures real national income during a period of time as well as higher per capita income for a long period of time accompanied by a decrease in the level of poverty and the achievement of justice and equality (Meier, 1970). In addition, economic development refers to economic growth accompanied by changes in output distribution and economic structure (Nafziger, 1984). Lastly, the noble laureate in economics, Amartya Sen defined development as a process of expanding real freedoms that people relish (Sen, 2001).

The cited definitions give the general concepts of economic development in terms of an increase of national income resulting in an increase of the per capita average income between the 1950s and late of the 1980s. After that period, the interpretation of development shifted to the overall development of society throughout the economic, social, political, cultural, and organizational development in order to provide a decent life for all members of the society (Todaro & Smith, 2005).

The shift over the decades of the concept of development emerged in different concepts and in the way it is measured. For instance, the tremendous evolution of economic development in Asia, specifically in the four Asian Tigers (South Korea, Singapore, Hong Kong, and Taiwan) countries led many economists, researchers, and international organizations to analyse the factors behind the remarkable growth in these countries. Thus, both the World Bank (WB) and the International Monetary Fund (IMF) valued this experience in resisting underdevelopment that started to call for the redevelopment of real indicators of measuring the development. The world began to recognise the importance of human capital in the enhancement of well-being. Thus, the concept of human development (HD) was launched in 1990 and adopted by the United Nations Development Program (UNDP) as a means to differentiate between nations and ways to measure the economic development (Todaro & Smith, 2015; Mascelluti, 2015). The concept not only focused on the economic aspect, but also on several dimensions, such as social and human (Sopotina, 2004).

[Type here]

Hence, economic development includes dimensions such social, economic, and human, which considers humans the main means to achieve prosperity. The term passed in different stages of transition based on considerations of economic development according to a certain period of time and conditions there. Therefore, the aim of this part of the dissertation is to focus on the term of human development and measure the three dimensions of the human factor as the main factor to any development and one of the main factors of production. The Human Development Index (HDI) is used to analyse the development in the UAE from 1990 to 2015 and examined that high level of development is corresponding with positive total factor productivity.

### **2.6.2 Human development (HD)**

According to the World Bank (WB), sustainable development cannot be achieved unless the development process includes the improvement of the standard of living, health, education, and alleviating poverty (Soubbotina, 2004; Bradlow, 1996; UN, 2007). The UNDP has been engaged in activity on the human aspects of development encouraging the emergence of a new vision of development clarified through the annual reports of the Human Development Report (HDR) issued since 1990 (Todaro & Smith, 2015). By 1993, the program of this new vision of development was launched under the title of “*Sustainable Human Development*” putting the human factor at the top of its priorities. The program was woven around the human asset (i.e. that development becomes a reality only through the development of human beings) emphasizing that the people are the true wealth of the nations and the only means of development (Sen, 1985; Sen, 2005).

According to the UNDP (1990), human development is defined as a process of expanding people's choices (UNDP, 1990). In fact, the options are the finest expression of the concept, that choices are the fundamental right of human beings. In principle, these choices can be infinite and change over time but the three basic options are as follows:

- Live a long and healthy life.
- Acquire knowledge.
- Get the resources needed for a decent standard of living.

The UNDP (1990) pointed out that if these three basic options do not materialise, many options are not available and many opportunities remain elusive. In addition to these options, the concept of human development incorporates many options estimated by the people in recognition of performance including political freedoms, social, economic, cultural freedoms, self-esteem,

[Type here]

empowerment and a sense of belonging to a community, the opportunities for creativity and production, human rights and others (Sen, 2000; Sen, 2005).

The UNDP (1993) defined human development (the development of people, for the people, by the people), as means of investing in the capacities of human beings, whether in education, health or skills so that they can work productively and creatively. Moreover, development for the people means to ensure the distribution of the fruits of economic growth (Ramirez et al., 1997; Ranis, 2004), in a wider and fair way. Development for the people also means giving each individual a chance to participate (Sen, 1985; Alkire, 2002; Sen, 2005; Todaro & Smith, 2015). This means that HD emphasises two aspects, one is the formation of human capabilities in the areas of health, education knowledge, and well-being, and the other is to empower people to invest their abilities either in enjoying leisure or in the production or in contributing to the political, social, cultural and other fields (Rioja, 1999; Robeyns, 2005).

The report of the UNDP generated the concept of enabling all individuals to expand their capabilities as much as possible in all areas. It also supports the options for generations unborn and the provision of the natural resource base needed to support development in the future (UNDP, 1993). This concept of sustainable development gives the highest priority to the reduction of poverty, non-productive, social integration and the rehabilitation of the environment, which makes the economic growth and translates it into improvements in the lives of human beings without destroying the capital needed to protect the opportunities of future generations (UNDP, 1994; UNDP, 2000b).

Sustainable development has three dimensions that seek to reconcile economic, social and environmental aspects (Burke, 2011). Through the economic dimension of production to cover all basic human needs and to improve their well-being and standard of living. This calls for the development of productive capacities and available techniques through supporting scientific research, stimulating companies to invest, and adopting modern methods of production and management to increase productivity. Second, the social dimension is to ensure uniform growth through the equitable distribution of wealth and resources, a fair tax system and the establishment of a social protection system that provides the right to all members of society without discrimination in access to health services and protection against life risks. Last, the environmental dimension is to reduce the harmful effects of productive activities on the environment and the rational consumption of non-renewable resources and to seek to develop the use of renewable energy sources and waste recycling.

[Type here]

Therefore, sustainable HD can be defined as a comprehensive development strategy, seeking to empower and build human capacities and capabilities to expand their options in various political, economic, social, environmental, health, educational etc areas (Todaro & Smith, 2015), with an emphasis on fairness and justice in the distribution of the wealth or benefits of both current and future generations (Anand & Sen, 2000), in order to make them able to invest the benefits created by globalisation and face or reduce the challenges (UNDP, 2010; UNDP, 2011).

In sum, the subject of HD can be determined as follows (UNDP, 2000b):

- HD is the core of concerns and expansion of all human choices, and not income alone, thus focusing on the whole society, not only the economy.
- HD enhances human's capabilities through investment in people.
- Economic growth is essential and stresses the importance of quality and distribution linked to human beings; it also deals with the options of sustainability from generation to generation.

Derived from the concept of HD, the development strategy based on the four factors of productivity, justice, sustainability, and participation stresses that development begins and ends with people, namely that development is for the people and by them and for them (Alkire, 2002; Alkire, 2005). Furthermore, it has to increase the capacity of individuals through education, health, and training in order to increase productivity, income, and the ability to satisfy peoples' needs (Rioja, 1999; Nafziger, 2006). On the other hand, it must be available to all individuals to have equal opportunities to contribute to furthering development and wealth, and ensuring equitable distribution (Ros, 2013). It must not only give equal opportunities to the current generation only, but also to the current and future generations, by ensuring the continuity of development (Alkire, 2002). Continuity includes the need to preserve the environment for future generations, which should involve people in the decisions that shape their lives in order to be for them and their development (Sen, 2005).

There is no doubt that education at all stages is the agreed mechanism for capacity development and creating talent (Schultz, 1961; Alkire, 2005). Therefore, a society that increases literacy rate is different from a society that is still dominated by illiteracy and ignorance (Nafziger, 2006). So, it is important to increase the awareness of all the communities of the need to raise the level of science, and to oblige the governments to intervene by subsidizing the poor families, and make them enroll their children in school in order to increase the learning level. Given that education plays an important role in human development, the opportunity must be provided for everyone to develop their abilities in science (Behrman & Wolfe, 1987; Psacharopoulos, 1994; Duflo, 2004).

[Type here]

Health services are also considered one of the important means in human resource development through the availability of health care and protection against diseases, which contribute to the longevity and reducing mortality (Mushkin, 1962; Schultz, 2005). The enjoyment of human good health is a central goal of human development because good health contributes to economic growth in several ways (Strauss, 1986; Anand & Ravallion, 1993):

- From the point of view of labour productivity: good health gives the individual the capacity to make more effort during the same time unit, and work for a longer time during the same day, which helps to increase production and productivity.
- Improved use of natural resources: good health of the members of the community and optimal use of and access to the natural resources can be difficult if humans are in bad health or are suffering from diseases.
- Good health helps humans to acquire knowledge and science.

The World Bank identified in its report “*World Development Report 1993; investing in health*” that the developing countries need to take decisive developing policies in the field of health in order to achieve development (Mundial, 1993):

- Direct large public health investments that help to provide cost-effective health care, which can greatly improve the health of the poor.
  - Better allocation of health expenditure on curative services, where governments should invest in health infrastructure, and improve the health units and centers.
- Increase the efficiency of government health programs, particularly in the pharmaceutical management.

### **2.6.3 The measurement of human development (HD)**

The Human Development Index (HDI): human development concept has gained a strong impetus by introducing a measure of HDI released in the first report of the year 1990. The index was based on a new concept and simple at that time (Anand, 1994; UNDP, 2000b). The report said that HD is not measured only by economic growth as was the practice, but is measured by quantifiable accomplishments achieved by countries in health and education (Todaro & Smith, 2015; Worldbank, 2012). The index measures the average of the country's achievements in three basic dimensions of HD:

- Health measured by life expectancy at birth as years.

[Type here]

- Education measured by the adult literacy rate, and the rate of the total enrollment in primary, secondary, and higher education.
- Standard of living, measured by purchasing power based on the rate of real GDP per capita.

To measure HDI specified minimum value and maximum value globally for each criterion, (UNDP, 2000b; Todaro & Smith, 2015), the report of the United Nations (UN) has adopted maximum, minimum values of its constituent indicators to guide the order:

- Life expectancy at birth (25, 85 years).
- Adult illiteracy (0%, 100%).
- The average years of schooling (15 years, zero).

The level of achievement for each dimension is calculated as follows:

$$\text{Dimension index} = \frac{\text{Actual value} - \text{Minimum value}}{\text{Maximum value} - \text{minimum value}}$$

**Equation 7**

HDI value ranging between the values of 0 and 1 is used in the ranking of countries in terms of degrees based on the process of human development (Desai, 1991; UNDP, 2000b). The human development index approaches high value when it comes close to 1, and drops when it comes close to zero. Therefore, it is calculated at a descending rate, according to countries and benched to the directory as follows:

- High human development countries by 0.80.
- Medium human development countries between 0.5 and less than 0.8.
- Low human development countries under 0.5.

This scale has several criticisms, notably that it does not lead to a more comprehensive understanding of human welfare and changes and overlooks a number of indicators reflecting the different aspects of human welfare (Stanton, 2007; Todaro & Smith, 2015). For example, the life expectancy at birth index does not necessarily express how safe is the physical health of the individuals. Secondly, the educational level may not reflect the adult illiteracy rate, and the contribution to knowledge acquisition and the development of abilities. Thirdly, per capita total income is an indicator of questionable accuracy when taking into account the inequitable distribution of income (Hou et al., 2015).

To remedy this deficiencies, the following standards for measuring human development have been introduced: The Gender Development Index (GII) indicating the sex development ratio, the

[Type here]

Gender Empowerment Measure (GEM) indicating the sex participation, and the Human Poverty Index (HPI) representing the development of poverty (UNDP, 2010). There was a need for amendments after 20 years of introduction of this index because of lack of data and poor using the methodologies not available in most countries in 1990 to measure the dimensions of income, education, and health (HDR, 2010), which was issued under the title: *The Real Wealth of Nations: Pathways to Human Development*. Per capita gross national income replaced GDP per capita to facilitate calculation of remittances from abroad for workers and official development assistance calculated for income per capita (Todaro & Smith, 2015; Hou et al., 2015). The upper earnings limit has been removed to allow countries that exceed the threshold of \$ 40,000 to have better measuring of the real level of income. In education, the indicator was replaced with an average expected year of schooling for children who are of school-age on the rate of enrolment, and average years of schooling for adults for the literacy rate. The aim is to provide a clearer picture of the state of education in each country (Hou et al., 2015; Todaro & Smith, 2015). In the area of health, life expectancy at birth remains the main index.

The New Human Development Index (NHDI) method uses geometric mean to compute the new HDI for the reason that it will ensure the expression of any poor performance in overall index by any dimension. On the other hand, the old method that used arithmetic mean through adding the three indices and dividing them by 3, did not ensure the expression of any poor performance in overall index of HDI value. Thus, UNDP noted that using the new way will capture the country's performance through measuring the three dimensions of well-being (Todaro & Smith, 2015). As a conclusion, instead of adding the three variables of health, education, and income indices and dividing them by three, the new way computed geometric mean as shown in the formula below:

$$\text{NHDI} = H^{1/3}E^{1/3}I^{1/3}$$

**Equation 8**

Where H: stands for health index, E: denotes education index, and I: represents the income index. Combine these three dimensions to form the final value of the HDI, which ranges between 0 and 1. The countries are classified according to their values in the ranking of the HDI in four categories:

- Very high human development.
- High human development.
- Medium level human development.
- Low human development.

[Type here]

Very high development category includes countries in with human development indexes higher than 0.75; in the category of high human development the index ranges between 0.75 and 0.5; in the medium category the range is between 0.50 and 0.26; and in the low it is lower than 0.26 (UNDP, 2010).

The Gender Development Index (GDI): the gender development index uses the same variables as those used by the HDI. It measures gender equality, and the difference between their equalities where development associated with gender as amending the average completion of each country in terms of life expectancy, educational attainment, and income in accordance with the degree of achievement between men and women (Willis, 2011). As a modification, GDI uses the maximum and the minimum age value which is expected to take into account the fact that women usually live longer than men, and the maximum value for women is 87.5 years while the minimum value is 27.5 years, while for men they are 82.5 years and 22.5 years. The calculation of income evidence is somewhat more complicated, because of the per capita GDP of female and male income earners (Bermaner, 2011).

These, in turn, upon establishing the ratio of female to male wage earners, and the percentage share of female and male share of the active population. In the absence of data on the average wage, 75% and female and male per capita income (PPP\$) are used in the same way as income in the HDI and income is used equally.

The Gender Empowerment Measure (GEM) is used to measure human empowerment by constructing two variables measuring the relative empowerment of men and women in political and economic fields. The first two sets of variables express the economic participation and economic decision-making as a percentage of a gender share of the professional and technical positions (Permanyer, 2011). Given the difference in the number of persons covered by each group, the detailed directory calculation for each category is the combination of each. The third variable is the percentage of men and women of parliamentary seats held, to express their political participation. For these three variables, a methodology is used to determine the weighted average population to arrive at a fair percentage equally distributed to both sexes, and then for each variable directory setting by dividing the percentage of the evenly distributed equation.

Human Poverty Index (HPI): HPI measures the overall progress in HD. It measures deprivations in terms of basic human development, the same dimensions as those measured by the HDI, this is a Multidimensional measurement of poverty (Permanyer, 2011; Todaro & Smith, 2015). There are two guides of human poverty, one for the developing countries and one for the industrialized countries. The first one focuses on aspects of deprivation through three basic dimensions: staying

[Type here]

alive (die at a very early age), knowledge (excluded from a world of reading and communication), and the level of a decent standard of living in terms of overall economic provisioning. The second one focuses on the following four dimensions of human life are: life expectancy, knowledge, standard of living, and social exclusion (Kovacevic, 2010).

## **2.7 Economic growth and human development (HD)**

There exists a comparable relationship between human development and economic growth (Ranis, 2004). Recent literature has described the former as the ultimate aim of the development process with the latter being viewed as a flawed proxy for more general welfare. As a result of the similarities in definition, human development has a far reaching impact on economic growth (Prados de la Escosura, 2015). This part provides a detailed description of the relationship that exists between economic growth and human development index.

There is a strong relationship between human development and economic growth (Grimm et al., 2008). Some evidence in this assertion is that increased incomes result in an increased range of capabilities and choices enjoyed by the households and governments (Anand & Sen, 2000). Similarly, enhanced economic growth results in increased human development.

Research shows that human development and economic growth influence each other to produce a two-sided chain (Ranis et al., 2000). The first side of the chain sees human development influencing economic growth. First, special concepts of economic growth such as gross national product (GNP) contribute to human development. The GNP does so through various household- and government-based activities. A specific level of the GNP may result in different improvement performances on human development depending on how it is allocated from one institution to the other.

In terms of households, high expenditure on goods and services results in low human development (Ranis et al., 2000; Anand & Ravallion, 1993). Contrary, the government can influence human development through resource allocation and imposing taxes. Areas that are highly taxed tend to have low human development as opposed to those favourably regulated. Similarly, areas that receive more resources from the government tend to produce high level of human development as opposed to those suffering from poor resource allocation.

On the other hand, human development relies on different factors to influence economic growth (Prados de la Escosura, 2015). In most cases, people who are healthy, well nourished and educated tend to contribute largely to the economic growth as opposed to their comparable counterparts

[Type here]

(Ranis & Stewart, 2005). Higher levels of human development influence the capabilities of the people and increases their creativity and productivity. Health and education of a given population provide a clear picture of the level of economic growth of a given region.

In conclusion, economic growth and human development depend on each other. Economic growth influences human development through the GNP and institutions such as the government and household. On the other hand, the influence of human development on the economic growth is embedded in a variety of factors including health status, education, and the nutrition status of a given community.

The objective of the study is to analyse two goals. The first aim is to analyse the real state of human development in the United Arab Emirates (UAE) through analyzing the Human Development Initiative (HDI reports) published by the United Nations (UN). Secondly, it analyses the source of economic growth in the UAE through the analysis of the three input factors of production. As part of the second objective, it examines the economic sector and economic activity (industry), which had an impact on the economic growth in 1990-2015. Thus, the connection between the level of development and productivity is investigated.

## **2.8 Economic growth and economic development**

The economic growth aspect is a measurable concept that makes a reflection of the long-term production increase in the country. This definition was agreed upon, but there are those who believe that economic growth is not just a quantitative indicator associated with indicators of measurement and evidence of improvement, such as the rise of economic sectors, rising per capita income, low unemployment, increased investments and higher trade. They are linked to other indicators such as living conditions and prosperity in any country. With those indicators being development and thus achieving economic growth. There is a connection between economic growth and economic development, from the perspective of Amartya Sen and Joseph E. Stiglitz, who are Nobel laureates in economic science.

According to Sen (1988), on economic growth, the expansion of food, housing, clothing, medical services, scientific facilities, rising life expectancy and the fight against crime and violence are key indicators of the well-being of living and development goals and thus a true indicator of economic growth. Economic growth is not just an improvement in GNP for long periods of time, it is continuous or improved by the relevant results to measure GNP, but it is related to the expansion of its link to life variables circumstance. The spread of crime and violence in any society is harmful even if there is a living prosperity. According to Stiglitz (2015), equality and

[Type here]

strong economic growth are complementary. Economic growth is not available in terms of living, health, education, security, as in most developed industrialized countries, led by the USA. Productivity in these countries is high, with living conditions and prosperity, but per capita income declines with the knowledge that these countries have sustained high economic growth. Economic growth is linked to the need for more investments in public goods, combating discrimination, regulating markets, antitrust, better regulated financial systems, better corporate governance, the promotion of workers' rights, and thus stronger economic growth achieved.

We, therefore, conclude that economic development and economic growth are not only provided by health, education and living services and by sustained growth in gross national income, but economic growth must be achieved through other important variables and thus reach the desired development.

## **2.9 The Role of economic sectors**

Every country economy breaks down into parts or economic sectors, where each part represents a sector in terms of employment and contribution share. The first attempt to clarify definitions, characteristics, and economic industries under each category of primary, secondary, and tertiary sectors was the work by Wolfe (1955), "The concept of economic sectors" published in 1955. The growth of primary, secondary, and tertiary sectors and shifts among them in terms of labour was given fame and importance by the well-known work "The Conditions of Economic Progress" by Clark (Clark & Others, 1967; Kenessey, 1987; Wolfe, 1955). According to Morris, it is not meant to criticize making a comparison between two sets of measurements, much rather to interpret the difference between each sector as he stated in his chapter "Dividing the Economy into Sectors" (Morris, 1952). The phenomenon of deindustrialization witnessed an increasing documentation in the 1970s, parallel with the decline in size of secondary sector in many of the developed countries (Mukherjee & Feller, 1978; UN, 1977; Bacon & Eltis, 1978; Blackaby, 1979).

According to Herrendorf et al. (2014), the fact of sectoral transformation, shifting, and growth was indicated as follows:

- An increase of nominal GDP was correlated with a decrease in the added value by the agriculture sector and its share of employment.
- An increase in both nominal GDP and employment share in the service sector.
- The manufacturing sector behaved differently from the other two sectors, where the share of labor and contribution formed a hump where it increased in a small level of development and decreased in long level of development.

[Type here]

- In poor trend countries, most of workers absorbed by agriculture sector and which considered as least productive sector.

Concerning sectoral structural transformation. In his paper “Economic growth of the nations” published in year 1971, Kuzents Simon distinguished two phases of the development process: an economy allocating most of its resources to the agriculture sector, and an economy reallocating developed resources to manufacturing and service sectors. Another analysis conducted cover 38 developing countries with data from 1965 to 2000, and nine developed countries with data back to 1870. The analysis of the process of the sectoral structural transformation found three main results. First, there was a heterogeneity of the sectoral structural change followed by the developing countries and not followed by the developed countries. Second, the sub-continent of Latin America, Asia, and Africa were following different sectoral structural change processes. Third, developing countries witnessed substantial sectoral structural transformation during a period of decline and of stagnation (Bah, 2008).

### **2.9.1 Primary sector**

The longstanding question raised in economics is related to why some countries are richer than other countries? The answer is that the process of industrialization took place very late and it was slow in the poor countries (Lucas, 2000; Ngai, 1999). The development of agricultural productivity is essential (Matsuyama, 1992). For instance, as argued by Nurkse (1991) “*everyone knows that the spectacular industrial revolution would not have been possible without the agricultural revolution that preceded it*”, and another statement by Rostow (1990) says that “*revolutionary changes in agricultural productivity are an essential condition for successful take-off.*”

The fact of structural transformation shifting from traditional sector such as agriculture to the non-traditional sector, such as the manufacturing sector in most developed and developing countries and their contributions to the total share of added value is highlighted in many studies in the field of economic sectors (Amirapu & Subramanian, 2015; APO, 2014; Herrendorf et al., 2014). For example, a study finds that an increase in the GDP over the last two centuries has been associated with a decrease in the added value by the agriculture sector and employment share (Herrendorf et al., 2014).

According to APO (2014), 29 Asian countries shifted away from the agriculture sector but the employment share was about 38% in 2012 compared to 61% in 1980 while the total share of value adding decreased from 14% to 10% from 1980 to 2012. A report reveals that the annual growth rate of the agriculture sector at constant price in the UAE recorded -2.8% and 0.0% in 2000 and

[Type here]

in 2012, respectively, while the labour productivity growth was -1.2% and -0.0% (APO, 2014).

### **2.9.2 Secondary sector**

The manufacturing sector is considered to be a key sector that assists the countries to make a rebound in economic development. In most Asian economies, specifically in their initial stage of development the manufacturing sector plays a significant role accounting for more than 20% of GDP. Before 1990, this sector absorbed especially workers displaced from the agriculture sector but after 1990 it has not been attracting employment regardless its continuing sound growth and expansion. A study shows that over the last 43 years the developed countries reduced the share of manufacturing employment in the total employment, however, statistics showed similar trends in the developing countries (Haraguchi et al., 2017). A study by Jorgenson and Timmer (2011) indicates that the share of manufacturing sector is declining in all regions (Europe, Japan, and US), accounting for 15% of GDP in 2005 (Jorgenson & Timmer, 2011).

A study of cross-sectional regression between 1990-2000 comprising 48 developing countries indicated that the manufacturing sector played a key role in growth while the tertiary sector played a similar role within this period (Dasgupta & Singh, 2006). Another study highlighted that beside the construction and service sector the manufacturing sector was a major factor affecting growth between 1973 and 2004 (Chakarvarty & Mitra, 2008). Thus, it can be concluded that the secondary sector played a major role in growth and quite a good share in the GDP. On the other side, this sector no more absorbed a high share of employment between the 1980s and 2000s. Some of the developing countries changed their path with more focus on the service sector.

### **2.9.3 Tertiary sector**

The economy of the US is the first service-based economy, where this shift could be noticed after World War II as described by Illeris (1996) in his book “The service economy”. The economy of the US witnessed a dramatic economic structure transition over the past half-century. The production portion of the secondary sector fell roughly to the half, while the service sector accounted for 75% in the early 2000s, followed by an increase ratio in employment (Triplett & Bosworth, 2004; Worldbank, 2016). Furthermore, the US’s value-added service reached its peak, almost 79% in 2009, and about 78% in 2014 (Worldbank, 2016). For instance, Japan witnessed a dramatic change following the US in the contribution share of the service sector to the economic growth in terms of added value and the size of employment specifically after the 1960s (Lörcher & Emi, 1980).

[Type here]

In terms of economic structure transformation, the developed countries witnessed a similar trend of structural change such as a decline in output of the agriculture sector and an increase in income per individual, while the share of the service sector increased with the inverted relationship of U-shape between per capita income and sector shares. On the other side, developing countries sustain a different path of structural change that can be explained by the hump-shape relationship between income and industrialisation. At an early stage of development, the service sector is characterised by a large portion of growth (Rodrik, 2016; Di Meglio et al., 2015; Moro, 2015).

The employment share and added value in the secondary sector declined most frequently over decades by raising the share of employment and the sector's output in the tertiary sector (Gemmell, 1982). A study examined the contribution of the service sector to GDP growth and the employment share of the sector and found that there was a moderate positive correlation coefficient relationship between the contribution share of the sector to GDP growth (Suvakkin & Gnanasekaran, 2015; Tachiciu, 2012).

In OECD countries, the tertiary sector is considered to have the largest share of contribution to their economies in terms of employment and added value accounting for about 70% (Jorgenson & Timmer, 2011; OECD, 2005). According to Uppenbergs & Strauss (2010), the tertiary sector is considered the key engine of growth in the countries of the European Union (EU) accounting for 75% in year 2005 compared to 60% in year 1994 (Uppenbergs & Strauss, 2010). Ghani & Kharas (2010) started to use the term "service revolution", specifically after India witnessed a rapid growth based on the development of some industries in the service sector without any intervention from the dominance stage of the manufacturing sector. In India, the growth is always driven by the tertiary sector whose contribution rose from 51% in the late 1980s to 64% between 2000-2012, while the contribution of the secondary sector was no more than 20% (APO, 2014). On the other side, China witnessed a similar dramatic change contributed by the tertiary sector (Storesletten & Zilibotti, 2014). In addition, there is an evidence that some service industries such as real estate, business activities, and finance push the Asian countries to the high-income level because of the increase of the industries' weights (APO, 2014).

In conclusion, the tertiary sector is a key engine for economic growth throughout its industries contributing significantly to the added value and employment share.

## **2.10 Production**

Production has seen several concepts and definitions over the history particularly by the first school of economics, which as a natural school gave more attention to the agricultural sector.

[Type here]

Then the classical school, headed by famous economists Adam Smith and David Ricardo identified the factors of production in general, namely labour, capital, and land. Also, the neoclassical school (marginal) formed by a group of economists such as Robert Solow and Trevor Swan identified a new factor, the technological progress among the production factors. Then in the last modern school of popular economists such as Domer, Lucas, Barro, Grossman and Heplman, and Aghion and Howitt came, and shed light on all the previous ideas and put them under one framework of a general theory of production (Barro et al., 1991).

The basic question that arises in this part is why some countries achieve higher growth rates over a certain period of time compared to other countries? The answer to this requires first to identify the determinants or the factors that help to encourage growth (Nafziger, 2006; Burda & Wyplosz, 2012). Recognizing the sources of growth had the most controversy over extended periods, and focusing on long-term growth has received the attention and the contribution of the economists in the 1950s of the last century. Various growth theories are currently linked heavily to the neoclassical theories developed during that period, and specifically the model by Solow-Swan (1956) is the cornerstone of these hypotheses.

## **2.11 Productivity**

Productivity can be identified as the relationship between inputs and output (Shebeb, 2011). Productivity is considered one of the most important measurements of economic performance, which is measured by the ratio of the total output to the weighted average of inputs (Samuelson & Nordhaus, 2010). By use of productivity as the measure of economic performance, high productivity has been identified as a sign of economic competitiveness and efficiency in its production cycle, while low productivity has always been affiliated with low power to produce and service which leads to a weak trend of economic growth (Shebeb, 2000). There are many different types for measuring productivity, such as single factor productivity that measures the output of one factor of inputs; multifactor productivity (MFP) which is calculated by dividing output to multifactors of inputs (OECD, 2001). The choice of one or another measurement method is mostly based on its purpose and availability of data. Labour productivity, capital productivity, and MFP are types of productivity measurements. MFP calculates by dividing output to all factors of input (labour, capital, and materials). The labour productivity measures per unit labour produced in working hours, and the capital productivity is either produced capital by output or capital per worker.

The measurement of economic productivity to analyse the economic growth through linking production function context was employed, a framework formulated by (Tinbergen, 1942), and

[Type here]

Robert Solow (1956). Today, as a result, the theoretical approach to measure the productivity offers a consistent roadmap (OECD, 2001). The production function is a mathematical formula which puts in relation the output obtained and the sum of the production factors such as capital, labour, and technology. The growth corresponds to the growth in the production obtained by the simple increase in the quantity of the factors of productions. Hence, the production of goods and services is due to a combination of factors of production (Oláh & Pakurár, 2013; Miles, et al., 2012). In terms of industry output, the growth accounting techniques help to examine the rate of change of combined factors. Production factors are used to measure the productivity of countries' economies (Nafziger, 2006; O'Mahony & Timmer, 2009). There have been various forms of productivity measures aimed at ensuring efficiency in the way economy converts input to output by the use of the available resources. Thus, the growth accounting approach is used to analyse the three main divisions (primary, secondary, and tertiary sectors) of the UAE's economy.

### **2.11.1 Role of the government and total productivity**

TFP is the most important element needed to achieve sustained economic growth in the long term (Solow, 1957). This variable is difficult to measure; the identification of some of the determinants can improve the rate of growth in this variable, as well as the determinants of technological development and human capital (Salas, 2007). The government has a role in many aspects that can affect the overall productivity of the factors of production and then the economic growth, including but not limited to the role of government in creating a legal system to protect individuals and enterprises to carry out production with their activities and services so as to achieve justice for them and they can reap the benefits of their business activities (Rioja, 1999; and Ros, 2013).

The government also affects the overall productivity of the factors of production by the political environment created (Rioja, 1999). The existence of a stable political system encourages investment and hence economic growth. The political instability of the state is one of the biggest factors that lead to the expulsion of investment and capital flight abroad. Therefore, several studies have shown a positive relationship between political and economic freedom on the one hand, and between the growth rates, on the other hand.

The government influences the macroeconomic elements of the economic policy (Barro, 1990). If the macroeconomic variables are inappropriate, such as high inflation rates, and a large deficit in the state budget, with a large fluctuation in the exchange rate of the local currency, these factors reduce investment activity and adversely affect the economic growth rates. Add to that, the financial policy of the government and public spending and the ways of financing the state budget, and tax rates are all that can be a positive or a negative factors of the overall rate of growth of

[Type here]

productivity of factors of production, therefore, from then on the rate of economic growth (Dang & Pheng, 2015).

After this theoretical background for the sources of growth, we can say that there are many variables that have been reviewed and that can be a source of growth and the cause of the decrease or increase of economic growth rates (Ros, 2013).

### **2.11.2 Economic sector's productivity**

Issues such as deindustrialisation or tertiarisation attracted attention of researchers. The productivity growth for the past ten years has been driven by the manufacturing and service sectors, where the first one reflected the higher growth rate (McCausland & Theodossiou, 2012). The measurement of productivity among countries in terms of sectoral level is more obvious. The manufacturing sector and some activities of the service sector deserved the highest increase rates. A sectoral cross-country study found that productivity was largely in different among the countries, it was larger in the agriculture and service sectors and smaller in the manufacturing sector (Duarte & Restuccia, 2010).

In a modern capitalist economy, one of the most important research hypotheses is that the manufacturing sector is the engine of growth (Fagerberg & Verspagen, 1999). First, the manufacturing sector represents the active production of scale, where the production and productivity will increase because of "learning by doing" (Young, 1928; Kaldor, 1966; Kaldor, 1967). In return, the productivity output will improve because it depends positively on the rate of growth of the manufacturing sector. Secondly, the manufacturing sector has a special function in promoting productivity growth because it has linkages with the non-industrial sectors.

According to some researchers, the rise of the tertiary sector corresponds with a declivity in the secondary sector because the tertiary sector is characterised by lower productivity than the secondary sector, which in return causes to harm the economy's future (Baumol, 1985; Wolff, 1985; Bjork, 1999).

On the other hand, some opposite findings stated that some industries of the tertiary sector indicated effective growth rate of productivity and that productivity does not necessarily go down because of the rising share of the service sector (Castaldi, 2009; Maroto-Sanchez, 2009; Mickiewicz & Zalewska, 2006; Buera & Kaboski, 2012). With the appearance of the new evidence of shrinking the share of manufacturing to the service sector in terms of employment share and the sector's output (Palma, 2005; Dasgupta et al., 2006; Rodrik, 2016), the traditional

[Type here]

idea of Kaldor's growth law that describes the long-run growth of productivity with the output linked to the growth of the secondary sector seems to exist no more.

Another study in reference to the economic structure transition in terms of the contribution share of employment and service sector to the GDP reports that countries in Central Asia and Eastern Europe changed their economies toward the service sector after 1990 and caught up with some Western European countries, where noticed improvement in the overall productivity (Alam, 2008). A study examining TFP with allocation of labour inside the three sectors in 45 developing countries found that the agriculture (primary) was the least productive sector followed by the service and manufacturing sectors (El-hadj, 2013). A time series study between 1975-1998 indicated that the manufacturing, water and electricity, and construction industries contributed the most to the UAE's GDP, followed by trade and service (Elhiraika & Hamed, 2006). A study indicated that the manufacturing and trade industries in 2005 were responsible for the growth of the non-oil sector, where they contributed about 20% and 17%, respectively, to the UAE's GDP. In addition, construction and real estate in the same year represented about 11% and 12%, respectively (Istaitieh et al., 2007).

In conclusion, the service sector started to dominate the contribution to the whole economy from the secondary sector and primary sector with a high share of employment and share of growth.

## **2.12 The United Arab Emirates (UAE)**

The UAE, situated on the Arabian Peninsula is a portion of the Gulf Cooperation Council (GCC) states. The UAE, established on the 2nd of December, 1971 consists of a federation of seven emirates namely Abu Dhabi, Dubai, Sharjah, Fujairah, Umm Al-Quwain, Ras Al-Khaimah, and Ajman. It has a total area of approximately 83,600 sq. Km (UAE, 2013). According to the UAE (2012), the UAE gained high notices worldwide of achieving excellence in different areas such as technology, communication, science, launching aerospace satellites, aviation industry, manufacturing industry, infrastructure, tourist, financial markets, economic governance, and even energy sector (for example clean energy plants). The UAE' economy has shifted from a low income based economy of fishing and pearling together with some agriculture to an oil-based high income economy within the last four decades. The UAE has been considered one of the major ten top oil producers and reservoirs in the world (BP, 2015). However, the UAE adapted diversification strategy to lessen its reliance on oil income and focused on different sectors of the economy driven by service, infrastructure, and industry.

[Type here]

Given the previous decades so far, we can see that the UAE has achieved significant growth and generated a positive result by diversifying its economy. The country has witnessed prosperity and well-being leading to growth. The United Arab Emirates today is a major financial center in the region and an international trading hub. Since its foundation in 1971, the United Arab Emirates' economic expansion has grown by 200 times. In addition, the UAE is considered to be the second largest economy after Saudi Arabia in the Arab world accounting for more than one fourth of total GCC's GDP in year 2012. Moreover, it accounted for nearly 14% of the total output (GDP) of the nations in the region (North Africa and Middle East) in year 2012. In sum, the diversification efforts have gained their way to economic growth driven by services, real estate and infrastructure spendings (UAE, 2013). One of the ambitious plans launched by the government in 2010 is the National Agenda for Vision 2021. According to (UAE, 2018), the world will witness significant economic structural change in the coming years, thus, the UAE Launched the national agenda UAE vision 2021, which aims at being part of this change. The approach expected from this strategy is to make the UAE an economic, commercial and tourism capital by moving it to a knowledge-based economy of about two billion people. This is to be achieved through promoting innovation, R & D, strengthening sector framework regulations, and focusing on high value-added sectors. These approaches to the strategy are aimed at attracting direct foreign investments and improving environmental business. The pillars of this strategy are as follows:

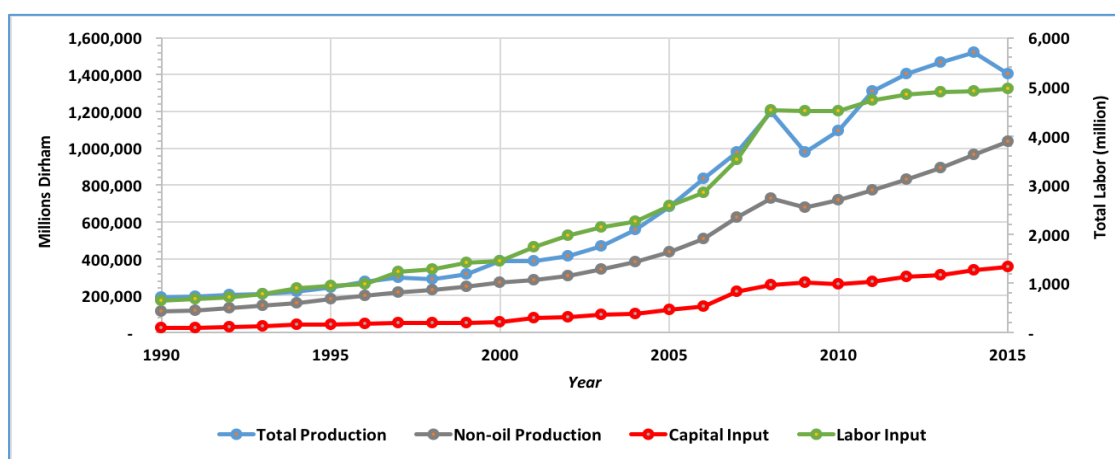
- Sustainable infrastructure and environment: Through this pillar, the government of the UAE looks forward to a perfect balance between environment, social and economic development while ensuring sustainable development.
- First-class education system: The UAE believes that education is an essential element for the development of the State and the best investment for its youth.
- Competitive knowledge economy: The main approach of this agenda, because the world will witness an important economic change.
- Safe public and fair judicial system: Through this pillar, the UAE seeks to be the safest place in the world.
- A cohesive society that maintains its identity: Through this pillar, the UAE seeks to maintain a cohesive society proud of its identity and sense of belonging.

On the other hand, and just like other developing countries, the UAE has come up with strategies to aim at improving national productive capacity as a way of improving its economic development (IMF, 2015). This has led to sustainable economic development in the country that has reduced its reliance on oil as the major contributor of the nation's GDP. The UAE is known as a major oil

[Type here]

and gas producing country and are considered as the seven largest ground tanks of crude oil and natural gas.

Figure 2 demonstrates the moving trends of total production (GDP), non-oil production, capital input, and labour input from year 1990 to 2015. Inputs in labour and capital were characterizing this rising between 1990-2015. Due to the decline in the world oil price, however, the country's total production shows a downward trend from the year 2015. Nevertheless, the descent of the total production, the production of the non-oil sector has improved towards the upside indicating the success of the strategy in the UAE to reduce dependence on oil revenues.



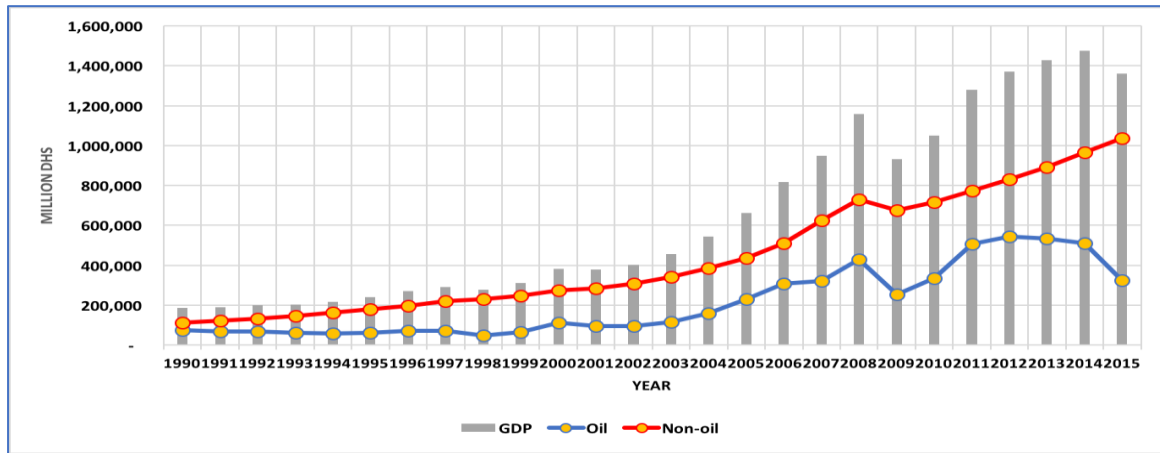
**Figure 2. Total Production and Inputs Moving Trend (1990-2015)**

Source: (FCSA, 2016)

### 2.12.1 The UAE's GDP structure

Conversely, established along the UAE's diversification strategy the oil share of GDP declined (Figure 3). The non-oil industries became the major players in the UAE's GDP output and contributed about 61% to UAE's GDP in year 1990 and 76% in the year 2015. This indicates the significant growth and impact of the non-oil sectors on the UAE's output production as described in (Figure 2). From 1990 to 2015 the non-oil sectors grew by about 26%. In addition, it has to be noted here that from year 2014 to 2015 alone the non-oil sectors grew by about 17%.

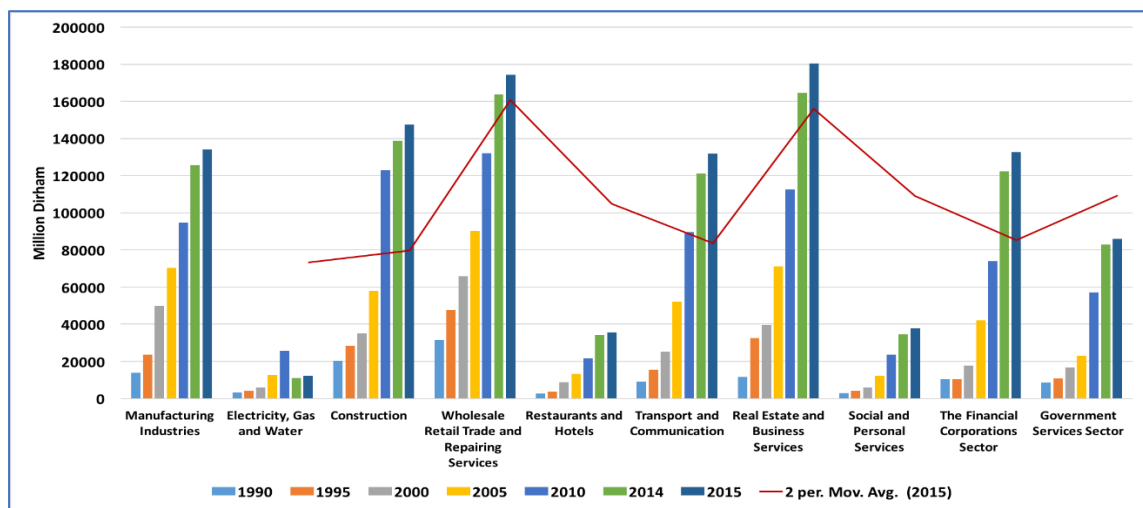
[Type here]



**Figure 3. The contribution of oil and non-oil in GDP's trend from (1990-2015).**

Source: (FCSA, 2016)

The major non-oil sector has been a key factor affecting the growth witnessed in the UAE through UAE's GDP growth since the adaptation of the diversification strategy. For this reason, it's important to identify those sectors that boost the expansion of the non-oil sector in the country (Moe, 2015). Data from FCSA (2016) identified these main non-oil sectors: construction and real estate produced 31% of non-oil GDP followed by retail with a share of 17% for the year 2015 (Figure 4). The other significant sectors contributing to the UAE's non-GDP were the financial sector with a 13%, and transport and communication with a share of 13%. The secondary industry contributed 13% to the non-oil's GDP in 2015. The UAE's government is benchmarked to have achieved 25% contribution by secondary industry to total output by year 2021 (UAE, 2013).

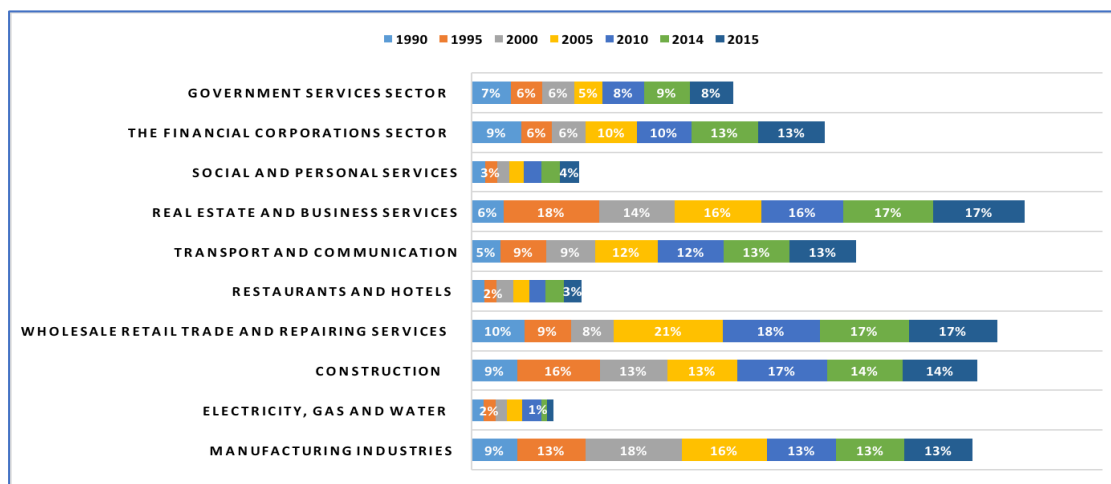


**Figure 4. Level of contribution of non-oil industries to UAE's GDP**

Source: (FCSA, 2016)

[Type here]

According to Figure 5, the non-oil industry made a remarkable contribution to the UAE's non-oil GDP in years 1990, 1995, 2000, 2005, 2010, 2014, and 2015: real estate and service business increased by about 11%, transportation and communication increased by 8%, retail trade made 7%, and the secondary increased by about 4%. On the other hand, the retail trade declined after reaching 21% in 2005, the construction sector declined from 17% in 2010, and secondary trended down after reaching 16% in year 2005.



**Figure 5. Non-oil industries's contribution to GDP for years (1990-1995-2000-2010-2014-2015)**

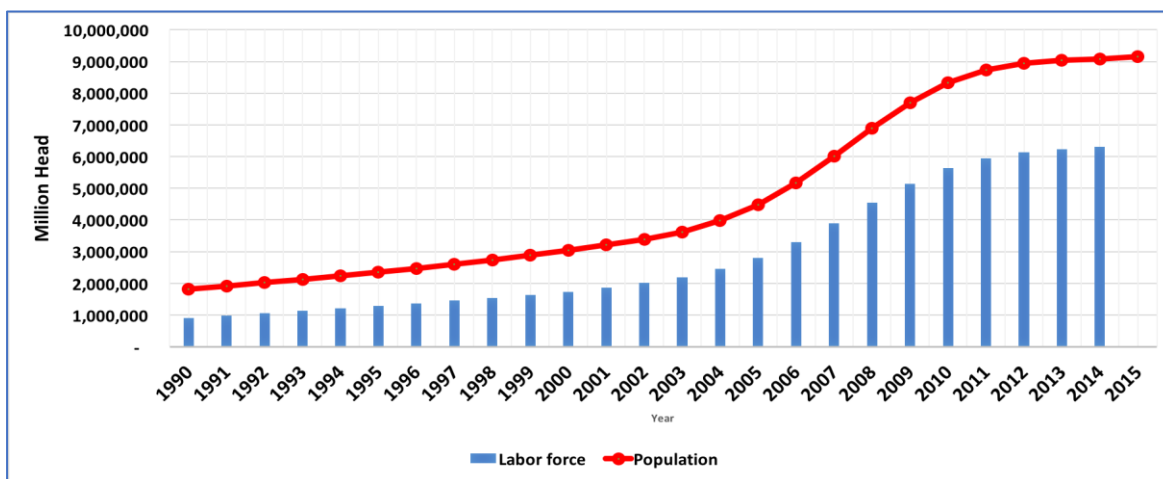
Source: (FCSA, 2016). Selected data

### 2.12.2 The UAE's labour force structure

According to the World Bank Database labour force can be identified as working age from 15 to 64 for both male and female. Labour force has a significant importance for every country, because it influences their performance directly (Easterlin, 1968). In return, the country's economy is also influenced by the power or the functioning of the labour force and the country's economy depends on the share of the labour force in the economic production, economic growth, and the labour market. Therefore, productivity of the labour force has an impact both on a country as a whole and on its economic growth.

In the UAE, individuals aged between 15 to 64 years are considered as part of the labour force whether or not they are actively working (Worldbank, 2015). According to the World Bank Database, total labour force of the total population of the UAE in the year 2014 accounted for 6.3 million people (Figure 6). The total population between ages 15-64 had a share of 85.13% and 84.92% in year 2014 and 2015, respectively (Worldbank, 2016). The ratio of citizens is very tiny compared to the total labour force in the UAE. Therefore, the domestic economy has become more heavily dependent on guest labour through contracting labour, which accounted for approximately 88.4% of the entire population in the mid-2015 (UN, 2016).

[Type here]



**Figure 6. UAE’s total population and labour force**

Source: (Worldbank, 2016)

The participation rate is an important measure when considering unemployment figures; it expresses the number of people looking for work but unable to find one. Thus, the labour force participation rate (LFPR) defines the number of workers either engaged in the economic system or looking for employment (Ben-Porath, 1973). Having raised from 51.25% measured in 1991, the UAE's LFPR in 2014 was 69.36% (WolframAlpha, 2016). In general, it is apparent from Table 1 that the share of labour force increased from 1990 to 2014 in the UAE. The active part of the labour force increased by 17.52% between 1991 and 2014. Thus, the UAE's labour force increased by 5.3 million heads between 1991 and 2014.

**Table 1. UAE's population share of labour force, and unemployment rate**

Year	1991	2014
Total labour force	51.25%	69.36%
- Active labour force	48.25%	65.76%
- <b>Unemployment rate</b>	3.00%	3.60%
Total population (million)	1,913	9,086

Source: WolframAlpha (2016)

The unemployment rate in the UAE is considered low, it was 3.6 % in 2014, as shown in Table 1. The unemployment rate moved between 3% in 1991 and 3.6% in 2014, which is considered to be a low rate based on international criteria (Almutairi, 2016).

Within the last two decades the rate of non-active labour force, namely those below 15 years of age, students, housewives, individuals not able to work, and individuals aged 64+ above seems to

[Type here]

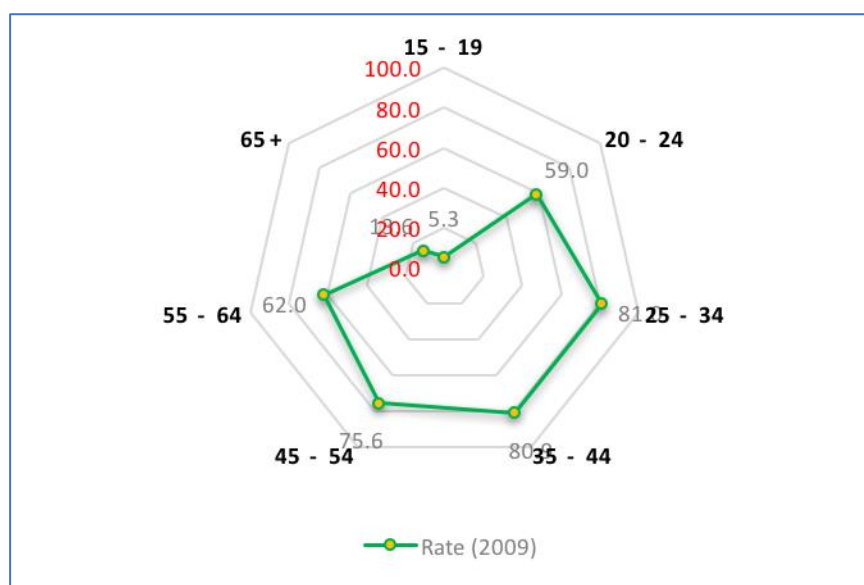
gradually decline in the UAE. Thus, the economic dependency ratio in the UAE has had a positive tendency, and according to Table 2 non-labour force accounted for just 17.75 % in 2015 which declined from 46.86% in 1990. The elderly dependency ratio was 1.33% in 2015 vs 1.71% in year 1990. The potential support ratio raised from 58.18% to 74.63% from 1990 to 2015, respectively.

**Table 2. Age dependency rate in the UAE (from 1990 to 2015)**

Year	1990	2015
Total dependency ratio (0-14 ages and age 65+above)	46.68	17.75
Youth dependency ratio (ages 0-14)	44.96	16.41
Elderly dependency ratio (ages 65+)	1.71	1.33
Potential support ratio (of population aged 15-64 per population 65+)	58.18	74.63

Source: World population prospects: The 2015 revision, knoema (2016)

In terms of employment, the labour market is shared between the guest labour and the Emiratis. The employment rate is 79% and 45%, for quest labour and for the Emiratis, respectively. The majority of the unemployed individuals is mostly fresh graduates, who are mostly below 25 years (Randeree, 2012). The labour market is made up of active labour force mostly aged between 25 and 54 years as illustrated in Figure7.



**Figure 7. Employment rate by group age (%)**

Source: (FCSA, 2015; Labour Force Survey 2009)

The main economic sector consists of a range of economic industries that occupy a certain percentage of the country's labour and added value in the country's economy (Peterson, 1984). In

[Type here]

the UAE, the main sector that hires a large part of the active workers is the construction sector within the emirates of UAE. As shown in Table 3, in years 1990, 2001, 2010 and 2015, the employment in the construction sector was 17.18%, 15.84%, 23.25%, and 23.25%, respectively. However, the change of the ratio was due to the diversifying strategy that was initiated by the rules of the country through many projects, related to infrastructure, building new cities and communities.

The second major sector that employs a high share of the active labour force is wholesale and retail trade. The trade sector, employed 14.6%, 19.22%, 19.46%, and 19.46% of the active labour force in 1990, 2001, 2010, and 2015, respectively, and remained fairly stable. Thus, in its grade trade sector remained to be the second major employer of the UAE labour force (UAE, 2013; IMF, 2015; Soto & Haouas, 2012). The secondary industries sector is considered in the third grade as the largest employer of the labour force. The sector's share of the active labour force was 9.58%, 12.80%, 11.28%, and 11.28% for years 1990, 2001, 2010, and 2004, respectively.

As indicated in Table 3, domestic service, agricultural sectors, and electrical, gas, and water, had seen a decline of their share in the active labour force. For agriculture, the ratio was 6.24% in 1990 and declined to 4.69 % in 2015. Domestic service in 2001 was responsible for 10% and declined to 8.08% in 2015. The share of electricity, gas and water was 2.98% in 1990 and declined to 1.17% in 2015.

In contrast, some of the economic sectors witnessed regular rises and declines: mining and quarrying in 1990 accounted for 1.44% and in 2015 for 1.31% of the active labour force, which indicates that the sector is used to feed the development plans for the government to boost the economy on the one side, and to take advantage of the high price of oil in the international market on the other side (UAE, 2013). The share of other sectors of the economy – the financial corporation sector, and restaurants and hotels sector – remained stable too. Also, the unemployment rate in the UAE is low and the participation rate of the labour force is relatively high (IMF, 2015; UAE, 2013).

**Table 3. Active workers by economic sector (1990, 2001, 2010, 2015)**

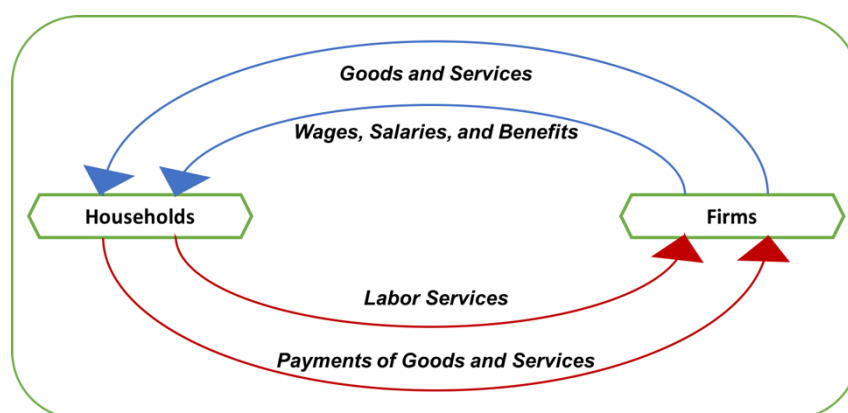
<b>Economic Sector</b>	<b>1990</b>	<b>2001</b>	<b>2010</b>	<b>2015*</b>
Agriculture, livestock and fishing	6.24%	7.99%	4.69%	4.69%
Mining and quarrying	1.44%	1.57%	1.31%	1.31%
Manufacturing industries	9.58%	12.80%	11.28%	11.28%
Electricity, gas and water	2.98%	1.63%	1.17%	1.17%
Construction	17.18%	15.84%	23.25%	23.25%
Wholesale, retail trade and Repairing services	14.60%	19.22%	19.46%	19.46%
Restaurants and hotels	0.00%	4.35%	4.29%	4.29%
Transport and communication	10.38%	6.60%	6.29%	6.29%

[Type here]

Real estate and business services	0.45%	2.93%	4.04%	4.04%
Social and personal services	11.26%	4.69%	3.88%	3.88%
Financial corporations	2.31%	1.29%	1.47%	1.47%
Government services	16.44%	11.11%	10.79%	10.79%
Domestic service	7.14%	10.00%	8.08%	8.08%
Total active labour force	694,201	1,929,022	4,903,968	5,383,728

Source: (FCSA, 2016), Data for year 2015\* has been estimated

The adoption of free market economy has contributed to the growth of the country's economy. The market based system gave the opportunity for demand and supply to determine the market prices. The adoption of free market economy policy by the UAE passed the major role in the country's economy to the private sector. The liberalization of the market was one of the major steps that has actually increased gross domestic product in the country (Randeree, 2012). The circular flow of demand and supply between the firms and the households in the UAE is presented by (Figure 8). These three representatives of the households include: local households that are mainly made up of UAE nationals, the non-local households including the expatriates that live in this country, and the collective household. This last group usually refers to the low skilled workers who mostly live in large collective housing units (Raven, 2011).



**Figure 8. Circular flow of demand and supply**

Source: (OpenStax, 2014)

The main role of these three households is the provision of labour and capital for the firms. The firms usually rely on this labour and capital in the production of the goods just as well as in the provision of services. In return, the households will receive income from the firms in various forms. This income usually serves as payment for the labour offered by the firms. The main sources of this revenue given to the households include: the revenue allocated to them for being a source of labour in the production process. They are also paid for being investors in the firms, and finally they receive funds from the government transfer as well (Raven, 2011). The cycle also

[Type here]

involves the households serving as the markets for the goods and services offered by the firms and even by the government. The households in the UAE usually spend some of their income they earn by providing labour to the firms on buying the products produced by the firms and the government in the supply and demand model.

The government projects now in progress are making significant impact on the growth of the labour force in the country. The regulation of the firms, the collection of taxes and the government transfers have had a huge impact both on the labour mobility from the households to the firms and on the flow of goods to the households. The government actually serves as one of the major consumers of goods provided by companies and has the ability to promote demand and supply in the market. The savings collected from the households, firms, government projects and even from foreign trade play a vital role in the supply and demand of both labour and goods in the UAE.

### **2.12.3 Productivity studies**

There are just some studies available about the source of growth that contributed to UAE's economy. Capital productivity played a significant role in transcending the labour productivity, but in terms of industries, the labour productivity showed better performance in real estate, finance, transportation, manufacturing industry, and the oil industry (Istaitieh et al., 2007). In the context of the causal factors of growth in the early 1980s and 2000s, growth in employment was higher than growth with physical capital discarding the business cycles. Soto and Haouas (2012) states that between 1975-2010 the average growth rate of 5.4% for the entire period was due to the capital accumulation (4% per year), which is considered the highest in the world that moved from a low to high-income level. In addition, the growth rate of human capital was low at an annual rate of 3.5%. The same study reported that average productivity per worker was stagnant for a long period of time, especially after the significant decline in the early 1980s. The report also pointed out that growth is the result of accumulation of capital and labor rather than the good use of factors of production. Also noted that in 2010, the average labor productivity is about half less that of advanced economies such as Singapore and Hong Kong (Soto & Haouas, 2012).

An increase in the labour force leads to slowing the change in TFP, while it pushes the increase in capital (Romer, 1990). A study in reference to the source of growth in the MENA countries indicates that the main source of growth was capital accumulation and not TFP (Senay et al., 2017). The UAE's growth of GDP is comprised of factors of production (labour, capital, and TFP) and oil rent pushed the use of capital and labour recourses (Haouas & Heshmati, 2013). Furthermore, a study underlines the massive dominance of labour over capital in growth contributions, where the labour contribution was 104%, the capital contribution was 30%, and

[Type here]

contribution by TFP was -32% between 1975 and 1999, where these results correspond to some oil-rich countries such as Kuwait and Venezuela (Elhiraika & Hamed, 2006). According to Soto and Haouas (2012), the UAE's economy is labour-intensive, where employment grew more than production and capital with cycle of the economy from the early 1980s to the 2000s.

In addition, the same study notes that the root of growth was capital and labour accumulation and not the efficiency allocated to factors of production from 1987-2010. Regarding TFP, the study states that the UAE's TFP growth was similar to that of the high income countries of the world with about 1.4% per year after excluding the oil industry from the calculation between 1987-1995. Also mentioned that between 1987 and 2010, TFP did not grow in the oil industry due to poor management of oil companies, according to the report. From 1995 to 2009, the growth of TFP started to trend downward (Soto & Haouas, 2012). Furthermore, a time-series study by Haouas & Heshmati (2013) between 1974-2007, tested a set of variables, where the result is that the gross investment is negatively correlated with the overall growth rate, the trade has a positive impact on the growth rate, natural resources have a negative correlation with growth, inflation negative impact of on the overall growth rate, the income of trading partners is positive, and human capital has a positive but in small rate. The study showed that there is a high increase in capital and composition with a clear fluctuation of up to 50% in total factor productivity. According to the study's analysis, capital is not used efficiently, and oil revenues are invested in projects of high cost, so they do not produce effective productivity. The study also pointed out that the rate of growth of labor is moving with the rate of growth of GDP, which indicates the inefficiency use of total employment. The study suggested investing in human capital and education.

As shown in (Figure 9), labour productivity in the UAE exceeds the capital productivity significantly regardless whether the calculations are based on oil or not. Labour productivity is the rate of GDP to the labour inputs mostly measured in the sum of working hours. Because of absence of new data, the author employed the data collected in October, 2008, which was the last worker survey conducted by the country of average working hours multiplied by the number of workers. Capital productivity is the ratio of a nation's GDP to the stock of capital or capital inputs (Shebeb, 2015). The figure below indicates the labour per hour productivity from year 1990 to 2015. The moving trend shows that the output per hour of labour was moving between 89.9 Dhs to 133.0 Dhs from 1990-2015.

[Type here]



**Figure 9. UAE's labour and capital productivity (1990-2015)**

Source: (FCSA, 2016)

From year 1990 to year 2002 the production declined from 126.4 Dhs to 89.9 Dhs, which is considered the lowest measured value recorded. On the other side, the trend was fluctuating from 2006 to 2015 with a high value of about 133Dhs in 2014. In general, the average productivity per hour of each worker from 1990-2015 was 112.3Dhs. In addition, the production per hour by worker reached the highest points only in years 1990, 2006, and 2014. The growth rate in yield per hour from 1990-2015 was -4% indicating the downward fluctuations of the trend.

Labour is one of the key factors of production that plays an important role in the growth of the UAE's economy. Without labour, all the other factors of production such as capital, land and entrepreneur cannot actually facilitate production. This is the main cause of the growth the UAE's economy realized after the development of the labour market had been made one of the key priorities of the country by phasing out the laws and policies that hindered the mobility of labour. The country's current economic growth has been due to the availability of both skilled and unskilled labour. Technology has actually had mixed effects on the supply and demand of labour.

In conclusion, there is benefit from productivity analysis in terms of sectors or industries, because it is more helpful for in-depth analysis. Another fact is that excessive use of resources, such as capital and labor, has an impact on other factors such as TFP.

### **2.13 UAE and the Gulf countries**

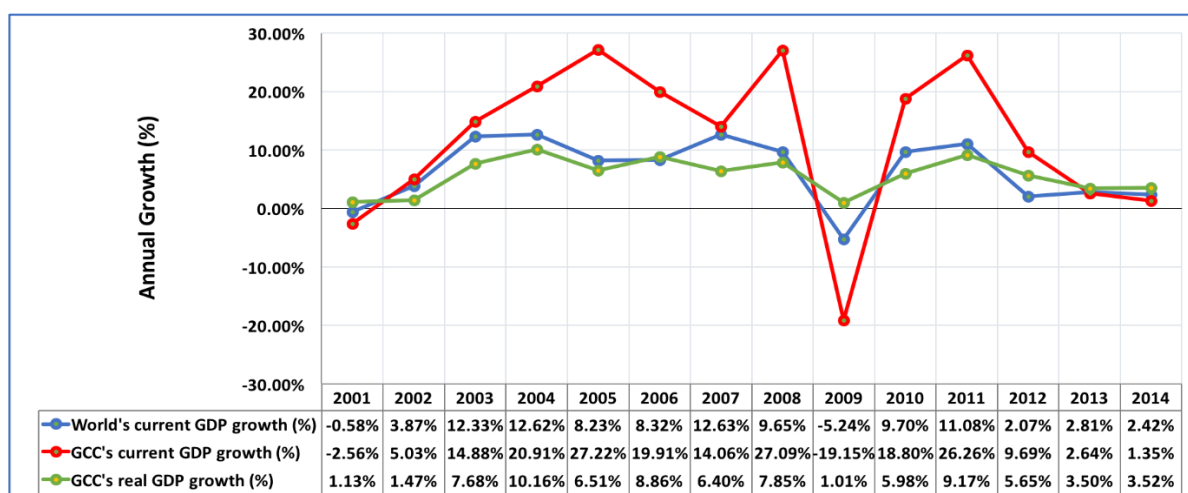
The Gulf Corporation Council (GCC) states includes Saudi Arabia (SAU), Kuwait (KWT, Oman (OMN), Bahrain (BHN), Qatar (QTR), and United Arab Emirates (UAE). The economies of the GCC are characterized by a similarity of components: heavy dependence on oil production and

[Type here]

export as a key resource for financing their development (Olah & Pakurár, 2013). During the period between 2001-2014, the GCC nations produced varying periods of growth rates, because of this unstable volatility in oil prices, their growth rates were different. Of course, given the importance of those economies to the outside world largely because they are considered to be major producers of oil.

During the period from 2001 to 2014 the GCC countries achieved high growth rates in real GDP achieving 1.13% in 2001 and hitting 10.16% in 2004. In 2008, however it dropped to 7.85% as a consequence of higher recorded levels of oil prices. The global financial crisis affected most of the developed economies (Figure 10) of the world including the GCC's countries.

The global economic and financial crisis led to a kind of recession in all the Gulf economies, where owing to the decline in the global demand for oil and the consequent lower prices the real annual growth rate in 2009 was 1.01%. As an outcome of the fiscal and monetary policies and the measures introduced by the governments of the GCC countries the growth rate in 2011 rose to 9.17%.



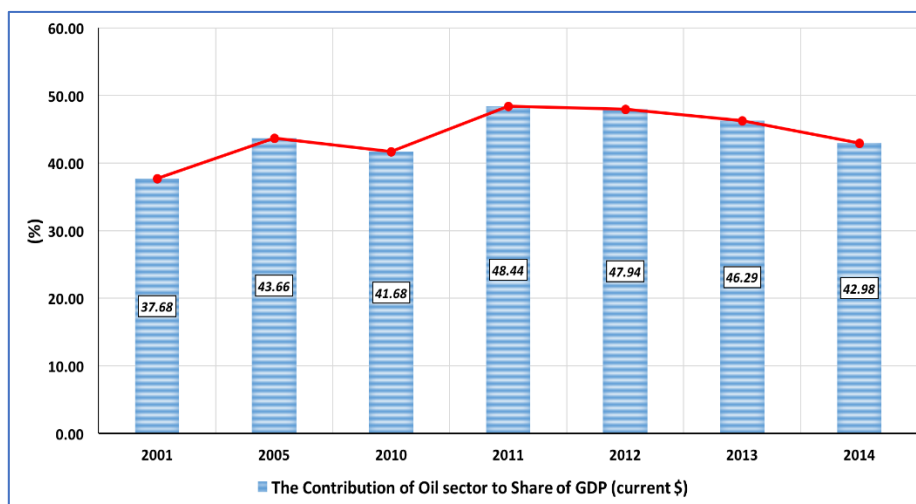
**Figure 10. Annual growth rate of GDP from 2001 to 2014**

Source: (Worldbank, 2017)

The GCC countries have taken significant strides in their economic development over the past decades, but they are facing a number of challenges in the light of the developments in the changing global economic environment. Nevertheless, these challenges affect the path of sustainable economic growth in the GCC countries relying heavily on oil commodity with decreasing price trends in the global market, where recently oil has suffered a 50% price dive. As illustrated in Figure 11, the oil sector is considered to be the most effective sector in moving the

[Type here]

Gulf economies and economic growth rates which constitutes almost half of the GDP of the GCC countries.



**Figure 11. The contribution of oil sector to GDP's share from 2001 to 2014 for GCC's countries**

Source: GCC statistical center (GCC-STAT, 2017)

In front of these challenges, the importance of economic diversification was toning up the industrial basis of production, supported the non-oil exports and improved the competitiveness of the Gulf economies. Thence, it confirmed future economic visions in the GCC countries to adopt policies aimed at diversifying the economy and freeing it from the domination of a single sector and rely on more than a single sector for growth (Table 4), especially in the wake of the decline in oil prices in 1998-1999. All the plans developed in the recent period seek to diversify economic activity and increase citizens' participation in the workforce. It is worth mentioning that most of the plans emphasize the need to increase productivity and competitiveness.

**Table 4. Development visions of GCC's member countries**

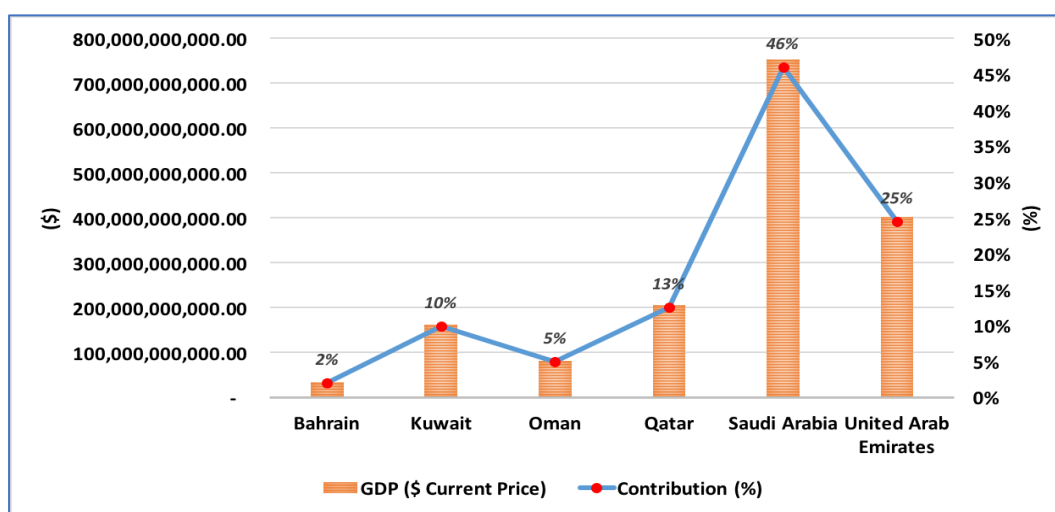
	Country	Development vision
1	United Arab Emirates	UAE Vision 2021
2	Bahrain	Economic Vision 2030
3	Kuwait	Kuwait Vision 2035
4	Qatar	Qatar National Vision 2030
5	Oman	Oman Future Vision 2040
6	Saudi Arabia	Saudi Vision 2030

Source: (Cabinet, 2017; BHN, 2017; KW, 2017; QNA, 2017; SCP, 2017; SAU, 2017)

[Type here]

### 2.13.1 GCC's GDP structure

The GDP of total GCC countries at current prices shows an annual average growth rate of 11.28% totalling 346.39% cumulative from 2001 to 2014 or from \$367 billion in 2001 to \$1635 billion in 2014, an increase of \$1268 billion. Saudi Arabia's GDP total for the GCC in 2014 contributed 46% followed by the UAE with a contribution rate amounting to a quarter of the GDP of the GCC countries. Qatar came in the third place with a contribution rate of 13% followed by the State of Kuwait in the fourth place with a contribution of 10%. While Oman and Bahrain contributed by 5% and 2.0%, respectively (Figure 12).



**Figure 12. Contribution (%) at total GCC's GDP at current prices (\$) in 2014**

Source: (GCC-STAT 2017)

GDP per capita is used to assess the level of economic development, the strength of the economy, and to evaluate the economic performance of the country reflecting the change in the output value of goods and services. GDP is also used to gauge the wealth of nations and improve the level of per capita income (Fleurbaey & Blanchet, 2013). As illustrated in (Table 5), the income per capita for selected years between 2001-2014 more than doubled in all GCC's countries except in the UAE and BHN. In 2014 Qatar ranked the top ten countries globally in per capita GDP (IMF, 2016).

**Table 5. GDP per capita (current US \$) for the period from 2001 to 2014)**

	2001	2005	2010	2011	2013	2014	Change (%)
BHN	12,917	18,418	20,386	22,034	24,114	24,515	90%
KWT	17,533	35,694	37,725	47,551	48,463	43,332	147%

[Type here]

OMN	8,560	12,399	19,921	21,164	20,205	19,130	123%
QTR	28,577	53,207	70,870	88,051	94,574	94,944	232%
SAU	8,316	13,274	18,754	23,256	24,646	24,406	193%
UAE	32,106	40,299	34,342	39,901	42,987	44,239	38%

Source: (Worldbank, 2017)

With a contribution to the GDP of 42% in 2014 compared to 46% in 2013 (Figure 11), the oil sector remains the main driver of the economic activities in the GCC. In contrast, the non-oil activity rate in GDP rose to 8.53% in 2014 and recorded \$949 billion added-value. The accumulated growth rate of non-oil sectors from 2001 to 2014 witnessed a high increase in Qatar compared to other states (Table 6).

**Table 6. Accumulated growth rate of non-oil sectors from 2001 to 2014**

	BHN	KWT	OMN	QTR	SAU	UAE
Accumulated growth rate (2001-2014)	264%	240%	294%	1284%	268%	238%

Source: (GCC-STAT 2017)

The mining and quarrying sector's share in each country's GDP is illustrated in Table 7. In Qatar and Kuwait, the oil production sector contributed more than half of the GDP on average from 2001 to 2014. These figures for Oman and Saudi Arabia were 46.18% and 42.54%, respectively, while in the UAE it reached 32.59% only and was followed by Bahrain with a share of 22.98%.

**Table 7. Mining and quarrying sector average contribution share (%) to GDP from 2001 to 2014**

Country	Average (%) from 2001-2014
BHN	22.986
KWT	53.262
OMN	46.818
QTR	54.581
SAU	42.540
UAE	32.599
GCC	42.131

Source: (GCC-STAT, 2017)

[Type here]

### 2.13.2 Population Structure

In terms of the total population of the GCC countries, statistics show a remarkable growth from 2001 to 2014 (Table 8). As a result of the evolution in the volume of economic activity, population growth continued to increase from 30.8 million in 2001 to a total of 50.5 million people in 2014, an increase of 67.21% over 14 years. Qatar and UAE had a remarkable population increase of 256% and 182%, respectively, while in Saudi Arabia the number of the population increased just by 40%.

**Table 8. Total population of GCC's member countries (2001- 2014)**

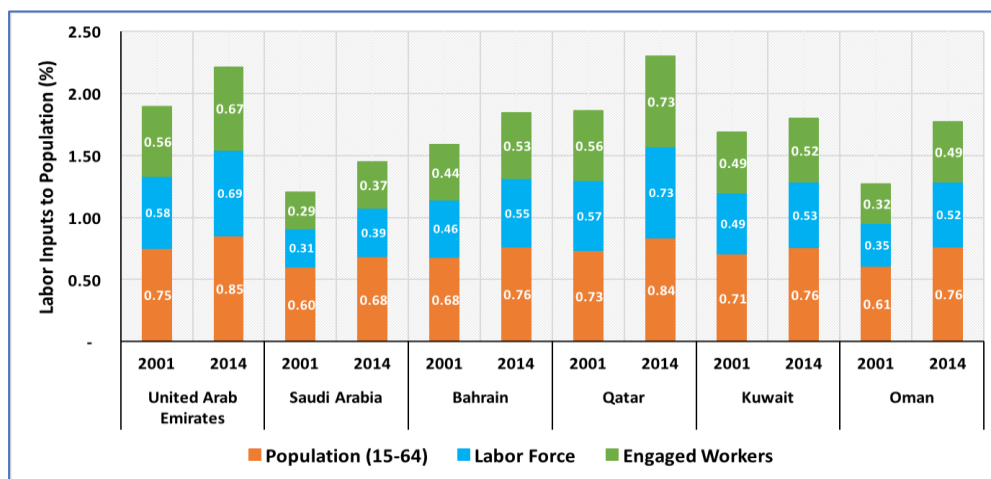
	UAE	SAU	BHN	QTR	KWT	OMN	Total
2001	3.22	22.01	0.69	0.61	1.99	2.27	30.80
2014	9.09	30.89	1.36	2.17	3.75	4.24	51.50
Change (%)	182	40	97	256	88	87	67
- (Numbers in million)							

Source: (Worldbank, 2017)

In parallel, the labour force jumped from 11.04 million in 2001 to 24.99 million in 2014 equal to a growth rate of 126.28% in the examined period. On the other hand, the number of engaged workers rose from 10.59 million in 2001 to 23.83 million in 2014, a cumulative growth rate of 125.11%. In terms of group ages, the total population in age groups between 15-64 years jumped from 19.44 million people in 2001 and to 37.78 million in 2014, which is an increase of 94.34%.

Figure 13 describes the percentage of population age groups (15-64), labour force and engaged workers for each member of the GCC countries from 2001 to 2014. In 2014 the percentage of engaged workers in the UAE (67%) and Qatar (73%) was higher, then in the rest of the GCC countries. On other side, this figure was lower in Saudi Arabia (37%). The percentage of population age groups (15-64) was higher than 70% for most member states in 2001 but especially in 2014. It represents the age structure of the population in the countries of the GCC indicating an increasing potential of active workers.

[Type here]

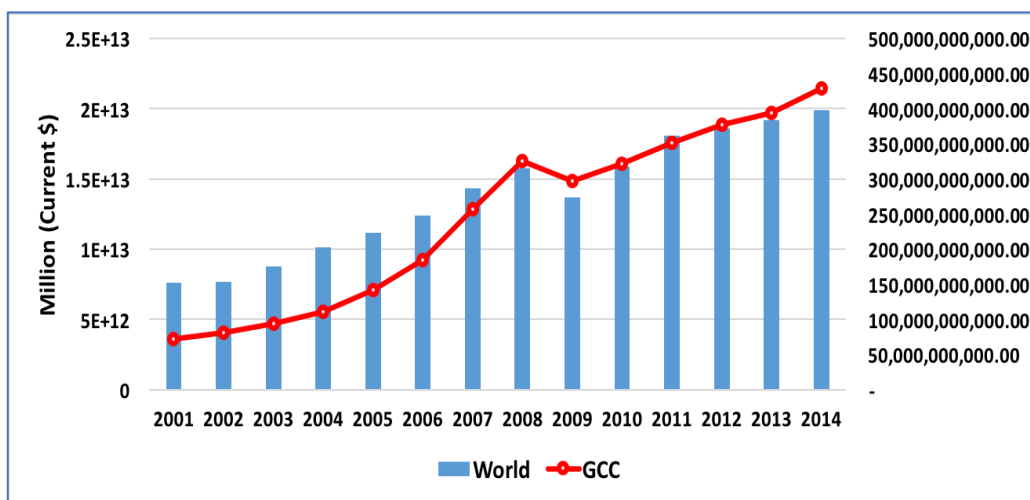


**Figure 13. Percentage (%) labour inputs to population in 2001 and 2014**

Source: (Worldbank, 2017)

### 2.13.3 Gross capital formation (GCF)

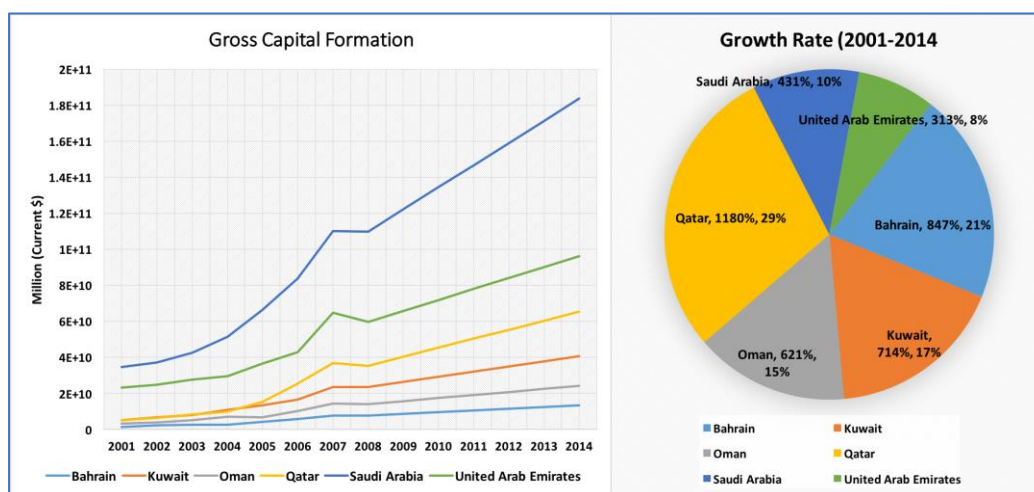
GCF contributes significantly to the economic growth. GCC's countries invested substantial proportions of their surplus or outputs in capital stock. From 2001 to 2014 the annual average growth rate of GCC's gross capital was 13.41%, cumulative 482.29%. In value GCF rose from \$72 trillion to \$429 trillion (Figure 14). The moving growth rate between 2001 and 2014 was 847%, 714%, 621%, 1180%, 431%, and 313% for Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and UAE, respectively (Figure 15).



**Figure 14. Gross capital formation trend for world and GCC (2001-2014)**

Source: (Worldbank, 2017)

[Type here]



**Figure 15. GCF's dollar (\$) valued trend and moving growth rate**

Source: (Worldbank 2017)

### 3 MATERIAL AND METHODS

#### 3.1 Research methodology

The appropriate use of growth accounting techniques depends on the availability of reliable statistics on output and factor inputs. The growth accounting is a quantitative tool for understanding and assessing the contributions through the production inputs (capital, labour, and TFP), and will be used as a quantitative and descriptive method in this dissertation as an empirical study (McGraw-Hill, 2013). The methodology for data collection is based on secondary data published by governments or international organizations as form of national accounts. These data sources are used in the literature review of the scope of previous studies in terms of the source of growth, human development, economic sectors, production function, and productivity that purpose to analyze in terms of whole economy, economic sectors, and sector industries. Panel-data and time-series were obtained from the year 1990 to 2015. In terms of the HD, the time-series information were collected from the year 1990 to 2015, from the UNs reports regarding the HDI of the UAE. In terms of cross-countries, the panel-data covered the period from 2001 to 2014, and because of limited information, six countries were analysed from the GCC's countries. The source of data is at most gathered and composed by the UAE Federal Competitiveness and Statistics Authority, the World Bank, the International Monterey Fund (IMF), the United Nations (UN), and other authentic sources.

[Type here]

The objective of the thesis is to analyse the source of growth in the UAE economy primarily in terms of sectoral approaches. Thus, the sectors are classified according to the International Standard Industrial Classification (ISIC) below (Nations, 2008; Bosworth & Collins, 2008):

- Agriculture, Live Stock and Fishing.
- Mining and Quarrying.
- Manufacturing Industries.
- Electricity, Gas and Water.
- Construction.
- Wholesale, Retail Trade and Repairing Services.
- Restaurants and Hotels.
- Transport, Storage and Communication.
- Real Estate and Business Services.
- Social and Personal Services.
- The Financial Corporations.
- Government Services.

The economic sectoral approach distinguishes three divisions such as the primary sector, the secondary sector, and the tertiary sector. The primary sector uses natural resource to produce goods such as livestock, fishery, and agriculture. The secondary sector refers to manufacturing or industry, where physical goods are transformed to other ones such as electricity, gas, water supply, and construction. The tertiary sector refers to the service industries such as banking, insurance, transportation, communication, trade, health, and education (Kenessey, 1987). The primary sector is composed of agriculture, livestock and fishing, the secondary sector includes mining and quarrying, manufacturing industries, electricity, gas and water, construction. The tertiary sector is composed of wholesale, retail trade and repairing services, restaurants and hotels, transport, storage and communication, real estate and business services, social and personal services, the financial corporations sector, government services sector.

Three main data were collected for the study according to the economic sector approach. The GDP of each of the economic sector, capital accumulation and labour was obtained from the Federal Authority for Competitiveness and Statistics (FCSA), except for the data estimated by the author for the period 2011-2015 due to lack of information for this time period. The author estimated the data based on two assumptions as follows:

- 2010 was taken as a base year for generating the percentage contribution of the number of workers in each sector and calculated in the next years.

[Type here]

- Presumed number of workers in a certain percentage of the population, according to each year sourced from the World Bank (WB).

The UAE's population of which the majority is guest labour coming into the country through a sponsorship by UAE's citizens in term to occupy an open job. The UAE has a unique characteristic of a very low unemployment rate. The UAE's citizens have around 11.5% share of the total population while 88.5% of the population are immigrants (Worldbank, 2016). Thus, the population data were taken from the World Bank, then divided for a number of workers for the year 2010 in the population to generate the difference added to next year, and implemented to next years.

### 3.2 Research variables

As previously noted and pointed out, the sources of growth are the capital, labour, and TFP. The primary factors are capital and labour, and the secondary factor includes TFP. The purpose of this study is to determine the percentage or the amount of the contribution of each of the three variables of the production using the Cobb-Douglas production function (Schmidt, 2008). The productivity of any country depends on many components, such as the capital share of capital per worker, the level of skills and education of workers, the technology used and good management of capital and labour through better allocation and utilization (Miles et al., 2012). The relationship of inputs and outputs is addressed in the production function (Figure 16):

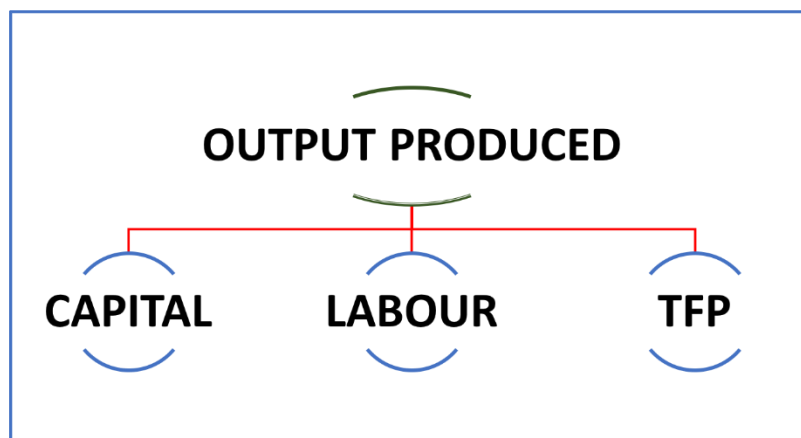


Figure 16. The production function

Source: (Miles & Scott, 2008)

#### 3.2.1 Independent variables

**Capital accumulation:** Capital accumulation or capital stock is defined as durable assets that serve to generate output of goods and services, also defined as the buildings and machines used in the production of the GDP. The capital stock is divided into three components: residential

[Type here]

buildings, non-residential buildings, and equipment (Miles et al., 2012). The accumulation of capital stock happens over time, which is much larger than the GDP produced within a period of one year. Mostly, the ratio of the capital to the GDP in the OECD countries in 1820 to 1992 ranged between 2 and 3 (Miles & Scott, 2008). The capital takes the shape of a stock of goods and services used in the production. It includes:

- Circulating capital: inventory of goods and services destroyed or transformed in the course of the production.
- Fixed capital: inventory of durable capital goods, equipment, building, and software used longer than a year in the process of production.

**Labour:** Represents the most significant factor of economic development, especially in the past (in the classic school), as it is considered the essential input (Harbison, 1973) in the production of goods and services. Training and education of workers are the most willing investment that help to advance the productivity of the workforce (Barro et al., 1991). Another perspective about labour is that economic growth does not only mean an increase in the GDP but a consequent increase in per capita real income in the sense that economic growth must be higher than the population growth rate (Barr, 1996). Labour force as part of the population is defined as working age between 15 and 64 years. The labour force is made up of employed and unemployed persons.

**Total Factor Productivity (TFP):** TFP measures the efficiency of inputs used to produce the end product. TFP is considered as a source for long-run growth that is measured by the technological change that increases due to technological inventions or improvements. According to Solow (1957) TFP is the most significant element needed to achieve sustained economic growth in the long term. It is called “Solow residual” that can only be explicated by the "technical progress" in the broad sense including essentially technology, innovations, skills, knowledge, training, etc. The TFP cannot be calculated directly but it can be obtained by deducting output from inputs, or by calculating the ratio of output to inputs.

In conclusion, three inputs (independent variables) are primarily associated with production to increase the productivity. The solution to increasing productivity is the increase of the capital accumulation and the improvement of the multifactor productivity (Miles et al., 2012). According to the AK economic growth model a country can achieve sustained growth with an increasing capital relying on saving rate without technical progress (Acemoglu, 2008).

[Type here]

### 3.2.2 Dependent variable

**Gross Domestic Product (GDP):** It is represented by the aggregate output in the nominal price of economic sector in respect of time. This study presents three major economic sectors. The primary sector, which includes agriculture, fishing, and livestock. The secondary sector includes manufacturing, mining, construction, and electricity, water, and gas. The tertiary sector includes wholesales, retails, repairing services, restaurants and hotels, transport, storage and communication, real-estate services, personal services, financial sector, and government services. The time series starting from 1990 to 2015 are collected from the FCSA.

### 3.3 Research hypotheses

Reviewing literature has influenced research approaches through a number of hypotheses ( $H_i$ ) and the author examined the applicability of each hypothesis. The following hypotheses will be studied and described as follows:

The capability approach is based on the hypothesis that when a nation holds a high level of development, this development corresponds with high positive productivity (Mustafa, 2013). Therefore, the author investigated whether the UAE has a high degree of development through the analysis of human development reports and some related information. Second, if the UAE has a high degree of development, does it have a positive impact on total factor productivity? Thus, our question was:

- $H_1$ : *High level of development in the UAE corresponded positively with TFP.*

In the sectoral approach two questions were formed as quoted from literature reviews. According to Rostow (1990), Matsuyama (1992), and Nurkse (1991) agriculture is a fundamental stage take-off for productivity growth. Thus, the author investigated in this hypothesis whether the primary sector was essential for the successful economic growth of the UAE within the examined period?

The second research hypothesis based on the neoclassical theory holds that the economy cannot grow endlessly through capital investment alone due to the law of diminishing returns to physical capital. Thus, the author investigated whether the capital accumulation made a significant contribution (high contributor rate) on the source of growth to secondary and tertiary sectors from 1990 to 2015. On the basis of literature review has been mentioned that the secondary sector is considered to be an engine in the growth of economy (Fagerberg & Verspagen, 1999). The idea was that the manufacturing sector helps to increase the productivity with scale of economy, which in result increased the supply and the demand for non-industrial industries (Young, 1928; Kaldor, 1966; Kaldor, 1967). In addition, the tertiary sector is more productive than the secondary sector

[Type here]

according to Kaldor's growth law (Palma, 2005; Dasgupta et al., 2006; Rodrik, 2016). Therefore, the hypotheses in the sectoral approach were as follows:

- *H<sub>2</sub>: The agriculture sector was an essential factor of economic growth within the examined period.*
- *H<sub>3</sub>: The secondary, and tertiary sectors increased due to capital accumulation, were the main source of growth in the UAE.*

In the industry approach, the UAE has been keen to transform its economy from an oil-based economy to one based on different industries because of the instability of global oil prices. Therefore, the hypothesis examined was whether the mining and quarrying industry had a significant impact on the growth rate of the secondary sector. For the tertiary sector, the hypothesis of research was whether the financial services industry had increased because of labour factor, which had a significant contribution to high growth rates.

- *H<sub>4</sub>: The mining and quarrying industry had a significant contribution on the growth of the secondary sector from 1990 to 2015*
- *H<sub>5</sub>: The financial corporations service industry increased due to labour which had a high contribution on the growth of the tertiary sector.*

In the country approach, the author studied the UAE among its neighbouring countries. These nations share the same culture, traditions, social affairs, political system, and so on, and as a unified group they are called the Gulf Corporation Council (GCC). The research hypothesis examined the level of development and productivity of the UAE compared to the other countries of GCC in addition to TFP productivity of the whole economy from 2001 to 2014.

- *H<sub>6</sub>: The UAE is more productive among GCC nations in terms of average growth rate of TFP from 2001 to 2014.*

### **3.4 Research data source**

#### **3.4.1 Sources of data using in capability approach**

The data used have been obtained from the Human Development Index (HDI) reports published by the United Nations (UN). To analyse the reality of human development in the UAE data were obtained from the reports from 1990 to 2015. Furthermore, some national resources were also used such as the Ministry of Education, the Ministry of Economy, and The Federal Competitiveness and Statistics Authority (FCSA) of the UAE.

[Type here]

### **3.4.2 Sources of data using in sectoral approach**

The data were sourced from the FCSA of the UAE for empirical investigation. The data were categorised by sectoral national accounts. The analysis was carried out with the panel-data approach (longitudinal data) for three major sectors and their industries from 1990 to 2015. The primary sector is agriculture, the secondary sector includes four industries such as mining and quarrying (MQ), manufacturing industries (MFG), electricity, gas and water (EGW), and construction (CN). And, the tertiary sector includes seven industries such as wholesale, retail trade and repairing services symbolised by (WRTRS), restaurants and hotels (RH), transport, storage and communication (TSC), real estate and business services (REBS), social and personal services (SPS), the financial corporations sector (FCS), and government services (GS). Three sets of data were collected: GDP, capital accumulation and number of workers classified by sector and industry from 1990 to 2015, with the exception of data on the number of workers estimated by the author from 2011 to 2015 as mentioned above.

### **3.4.3 Sources of data using in industry approach**

With regard to the industry analysis, the data were obtained from FCSA in the UAE for the empirical study. Data were classified by industries for the period from 1990 to 2015. The primary sector was considered a sector, while the secondary sector consisted of four industries, MQ, MFG, EGW and CN, the third sector of seven industries, namely WRTRS, RH, TSC, REBS, SPS, FCS and GS.

### **3.4.4 Sources of data using in country approach**

The were primarily gathered and composed by the country databank (World Bank) and GCC Statistical Center (GCC-Stat). Panel-data collected from the GCC members include Saudi Arabia (SAU), United Arab Emirates (UAE), Qatar (QTR), Bahrain (BHN), Kuwait (KWT) and Oman (OMN) from 2001 to 2014. The objective here was to analyse the productivity and source of growth by exploring the position of the UAE among the GCC countries from 1990 to 2015. Due to the lack of data, the author conducted the analysis between the period of 2001-2014. The author used a method of generating the number of workers based on the methodology used by Molnár & Máté (2016). The variables sourced from country database published by the World Bank are labour force, total population, population group age (15-64 years old), and unemployment ratio. Also, GDP in constant dollar price and capital gross formulation were sourced from the World Bank database.

[Type here]

### 3.5 Research theoretical framework

#### 3.5.1 Human development (capability approach)

HDI is a measurement of human capabilities or in other words it is a social welfare approach, where the human can be functioning and has a free opportunity. This part illustrates the methodology and framework used to generate the HDI figures. The author based his analysis on those published figures. Thus, the author believed it was important to clarify the framework used between the year 1990 and 2010 and after 2010 by the UN.

Between 1990 and 2010 the framework defined as the simple arithmetic average of the indicators measured at the level of income, education and health development as shown in the equation below (Klugman et al., 2011):

$$HDI = (1/3) * (D_h + D_e + D_{1s})$$

Equation 9

Where  $[D_i]$  indicates the sub-index for dimension  $[I]$ , which with  $[i = \{h, e, s\}]$ , indicating the health, education, and standard of living, respectively. The three dimensions represent the country achievements in each. Education used two indicators: gross enrolment ratio ( $ger$ ) and literacy ( $lit$ ), whereas, life expectancy ( $le$ ) and GDP per capita ( $gdp$ ) where the proxies for health and living standards, respectively. Thus, indicators were normalized using certain upper and lower limits. As follows:

$$D_h = \frac{(le - le_{min})}{(le_{max} - le_{min})}$$

Equation 10

$$D_e = (1/3) * \frac{(ger - ger_{min})}{(ger_{max} - ger_{min})} + (2/3) * \frac{(lit - lit_{min})}{(lit_{max} - lit_{min})}$$

Equation 11

$$D_s = \frac{(\ln(gdp) - \ln(gdp_{min}))}{\ln(gdp_{max} - gdp_{min})}$$

Equation 12

Each sub-index  $[D_i]$  varies between 0 and 1, which is the sum of the arithmetic sum of the dimensions given 1. Also, the minimum and maximum limits were  $(le_{25\ years} - le_{85\ years})$ ,  $(lit_{0\%} - lit_{100\%})$ ,  $(ger_{0\%} - ger_{100\%})$ , and  $(gdp_{\$100} - gdp_{mi\$40000})$ , respectively for health, education, and living standards.

From the year 2010, the HD reports introduced a new modification, which replaced the Equation 9 as expressed in equation below. Life expectancy denoted for health achievement, the GDP

[Type here]

replaced by Gross National Income (gni) indicating living standard, and mean of years (mys) and expected years of schooling (eys) measuring the education achievement. Thus, the methodology expressed in equations below after Equation 13.

$$HDI = (D_{health} * D_{education} * D_{living\ standard})^{1/3}$$

Equation 13

$$D_h = \frac{(le - le_{min})}{(le_{max} - le_{min})}$$

Equation 14

$$D_e = \left( \frac{(mys - mys_{min})}{(mys_{max} - mys_{min})} * \frac{(eys - eys_{min})}{(eys_{max} - eys_{min})} \right)^{1/2}$$

Equation 15

$$D_s = \frac{(\ln(gni) - \ln(gni_{min}))}{\ln(gni_{max} - gni_{min})}$$

Equation 16

Each dimension equal same weight in aggregate where  $(le_{max} - le_{min}) = (20,83.2)$ ,  $(mys_{max} - mys_{min}) = (0,13.2)$ ,  $(eys_{max} - eys_{min}) = (0, 20.6)$ , and  $(gni_{max} - gni_{min}) = (\$163, \$108,211)$ .

### 3.5.2 Growth accounting (sectoral approach)

Solow proposed a formal model of growth that put the role of the factors of production on productivity (Solow, 1957). This model (Equation 17) is based on a production function of two factors: labour and capital. Therefore, production [Y] results exclusively in the implementation of the combination of a certain quantity of capital [K] and labour [L]. The third factor of production introduced by the neoclassical school (Solow, 1956) was a technological progress [A] known as “Solow residual”. The Solow residual is obtained from subtracting inputs from output called TFP, which represents not only the technology used but also the improvements in the production process, innovations, practice of management and institution, skills, etc. TFP is the most significant factor needed to achieve sustained economic growth in the long term (Solow, 1957).

$$Y = A(K, L)$$

Equation 17

The growth accounting tool is the exponential growth function form helping to express the share of contribution of production factors (Hulten, 2010). The growth accounting framework doesn't give answers to the fundamental causes of growth, but it identifies the important sources of growth (OECD, 2001). The methodology applied in this study is quantitative and descriptive. The growth accounting framework was used to analyse the share of the contribution of three types of input (capital, labour, and TFP). The Cobb-Douglas production function was used to analyse the variables in long-run growth (Wolff, 1994). This framework takes the below form with respect

[Type here]

of time:

$$Y_t = A_t K_t^\alpha L_t^{1-\alpha}$$

**Equation 18**

Where  $[Y_t]$ : is noted as the sector's output,  $[K_t]$ : represents the sector's capital,  $[L_t]$ : represents the sector's number of workers,  $[A_t]$ : is the total factor productivity (TFP),  $[\alpha]$ : represents the capital's share,  $[\alpha - 1]$ : is labour's share, and assuming diminishing return to scale that capital's share is 0.3 and labour's share equals 0.7 (Piketty, 2014). Also, assuming a competitive market, constant returns to scale, competitive market factors, and neutral technical progress (Solow, 1956). The change in output is back to the three variables, the alteration in capital stock, change in the number of workers, and improvement in TFP (Wolff, 1994).

To illustrate the equations of practice: For the first variable, capital, the value of the change from the present value  $K_t$  to  $K_t + \Delta K$  is an increase in the change in the proportional value of capital by  $\frac{\Delta K}{K_t}$ . Therefore, if we apply a rule of thumb that the capital that was increased was  $[\alpha]$ , the proportional amount that increased of capital stock in the output resulting from the capital change as an equation:

$$\frac{\Delta Y}{Y_t} = \alpha \cdot \frac{\Delta K}{K_t}$$

**Equation 19**

For the second variable, labour, in terms of an increase in labour from  $L_t$  to a value  $L_t + \Delta L$  as proportional amount of  $\Delta L/L$ . In labour variable raised to  $[1 - \alpha]$ , so can reveal the proportional amount increased in output as change in labour is:

$$\frac{\Delta Y}{Y_t} = (1 - \alpha) \cdot \frac{\Delta L}{L_t}$$

**Equation 20**

The change in the TFP as a third input variable, due to the effect on production as a result of the change in the TFP. Any relative increase will produce the relative quantity in the output:

$$\frac{\Delta Y}{Y_t} = \frac{\Delta A}{A_t}$$

**Equation 21**

Therefore, taking into account all three variables that have changed practically including (Equation 19), (Equation 20) and (Equation 21). The result of the output growth rate in the economic sector refers to the equation below which has been rewritten in log-logarithmic format.

$$\ln \frac{\Delta Y}{Y_t} = \alpha \cdot \ln \frac{\Delta K}{K_t} + (1 - \alpha) \cdot \ln \frac{\Delta L}{L_t} + \ln \frac{\Delta A}{A_t}$$

**Equation 22**

[Type here]

Thus, looking at the equation (Equation 22), the first part  $\alpha \cdot (\Delta K/K)$  represents the contribution of capital to the sector's output growth, the second part,  $(1 - \alpha) \cdot (\Delta L/L)$  represents the contribution of labour to the sector's output growth, and  $(\Delta A/A)$  is the third element that reflects the contribution of TFP to the sector's output growth. The contribution part of TFP as a result of subtracting from the three variables is as shown in the equation below:

$$\frac{\Delta A}{A_t} = \frac{\Delta Y}{Y_t} - (\alpha) \cdot \frac{\Delta K}{K_t} - (1 - \alpha) \cdot \frac{\Delta L}{L_t}$$

Equation 23

In terms of calculating the average annual growth rate, we used the "AVERAGE" formula in Microsoft Excel to generate the result through each variable such as  $(\Delta Y/Y)$ ,  $(\Delta K/K)$ ,  $(\Delta L/L)$ , and  $(\Delta A/A)$ , by groups of periods such as (1990-2015), (1990-2000), (2000-2010), and (2010-2015).

### 3.5.3 Growth accounting (industry approach)

The exercise of growth accounting decomposing the growth into the contribution from physical capital, labour, TFP started largely for empirical studies after World War II (Denison, 1962; Jorgenson & Griliches, 1967; Feinstein, 1978). Computing the source of growth follows the simple neo-classical aggregate Cobb-Douglas production function introduced by Solow (1956, 1957), as  $Y = f(K, L, residual)$ , where the framework takes mathematical form as Equation 18. As Equation 18 represents in time  $[t]$ , where the  $Y_t$  is industry output (the share to GDP),  $K_t$  is physical capital by industry,  $L_t$  is a number of active workers shared by industry,  $A$  is TFP (technological efficiency), and  $a$  and  $1 - a$  are the share of capital and labour paid from income, respectively. The thumb-rule employed in terms of the share paid from income were constant based on assumption constant return to scale, in this study, where capital share was 1/3 and labour share was 2/3 (Piketty, 2014). By illustrating the practice equation for computing the contribution share for three variables (capital, labour, and TFP) to industry's growth as presented in the equation below:

$$\Delta Y_t/Y_t = \alpha \cdot \Delta K_t/K_t + (1 - \alpha) \cdot \Delta L_t/L_t + \Delta A_t/A_t$$

Equation 24

Therefore, (Equation 24) is expressed in capital as  $\Delta K/K$ , in labour as  $\Delta L/L$ , and TFP as  $\Delta A/A$ , after only the thumb-rules for capital (1/3) and labour (2/3) are applied. The growth contribution due to capital was generated as  $\left[ \frac{\Delta K/K}{\Delta Y/Y} \right]$ , due to labour  $\left[ \frac{\Delta L/L}{\Delta Y/Y} \right]$ , and TFP was calculated as residual remaining from  $\Delta A/A_t = \Delta Y/Y_t - \Delta K/K_t - \Delta L/L_t$ , and growth contributed due to TFP calculated from  $\left[ \frac{\Delta A/A}{\Delta Y/Y} \right]$ .

[Type here]

### 3.5.4 Growth accounting (country approach)

The source of growth are capital, labour and total factor productivity (TFP). In order to determine the percentage or the sum of the contribution of each of the three components of production the simple neoclassical Cobb-Douglas production function is used, as shown in Equation 18. [Y] represents the output GDP (constant LCU), [K] represents the Gross capital formation (constant LCU), [L] is the human capital stock, [A] denoted as technology progress impact on productivity without affecting inputs (labour and capital) such as improvement in production processes, innovations, institution's practices and management, and so forth. The study takes the constant return to scale which [a] equals 1/3 of capital and human inputs, and [t] indicates the period of time.

The total number of active workers is not available for some nations. Therefore, the author used an approach to generate the total engaged workers from available World Bank data (Molnár & Máté, 2016). Labour force (LF) can be divided in two parts, namely employed and unemployed people. Labour [L] is equal to the total engaged workers: LF minus the number of unemployed persons expressed in the equation  $[L] = LF - U$ , where [U] denotes the number of unemployed individuals and  $[U] = u * LF$ , where [u] denotes the unemployment ratio. In other words,  $[L_t] = LF_t * (1 - u_t)$ . Moreover, the labour capital can be calculated with  $L_t = p_t * a_t * P_t * (1 - u_t)^{1-a}$ , where [p] is participation rate estimated with  $[p] = LF/N$ , where [N] represents the working population in the age group of (15-64 years old), and [a] is a sample of the active to total population ratio calculated with  $[a] = N/P$ , where [P] samples the total population. Consequently, the production function Equation 18 can be written as below:

$$Y_t = A_t K_t^a (p_t a_t P_t (1 - u_t))^{1-a}$$

Equation 25

From the last Equation 25 we can rewrite the equation in logarithm to indicate a log-liner form as follows:

$$\ln Y_t = \ln A_t + a \ln K_t + (1 - a) \ln p_t + (1 - a) \ln a_t + (1 - a) u_t$$

Equation 26

Rewrite of Equation 26 to get the labour productivity including and its contribution inputs denoted with K, L, and A. Labour productivity [y] can be approximated by dividing each side of the Equation 25 to [P], as written in Equation 27, where labour productivity expressed as [gy] indicates the changes in GDP per capita, capital productivity per labour as [gk], and [gA] as TFP per labour. The purpose of labour productivity estimation is to indicate how much average added value was generated by each employed person.

$$y = A_t K_t^a (p_t a_t (1 - u_t))^{1-a}$$

[Type here]

**Equation 27**

The panel-data analysis from 2001 to 2014 for the GCC member countries is used to calculate the contribution of capital, labour and TFP to the whole economy and the average value-added per capita manner that calculates labour productivity. The data for variables were obtained from countries database, the World Bank from 2001 to 2014. As described earlier the equation 27 represents the GDP (constant LCU), gross capital formation (constant LCU), and labour that consisting of total population, total population ages (15-64), total labour force, and total unemployment ratio of labour force.

[Type here]

## **4 RESEARCH FINDINGS AND EVALUATION**

In this chapter, the findings presented in sequence are based on four approaches: capability approach, sectoral approach, industry approach and country approach. Approaches used secondary data methodology to investigate the objectives and research questions. The first approach is based on the HDI reports and some reliable sources in order to find out the level of development in the UAE from 1990 to 2015. The other approaches use the neoclassical framework to analyse the source of growth based on the three production factors. The results below are classified according to each approach and offer answers to the research hypotheses. Tables and figures are used to summarise the findings.

### **4.1 Evaluation of human development performance.**

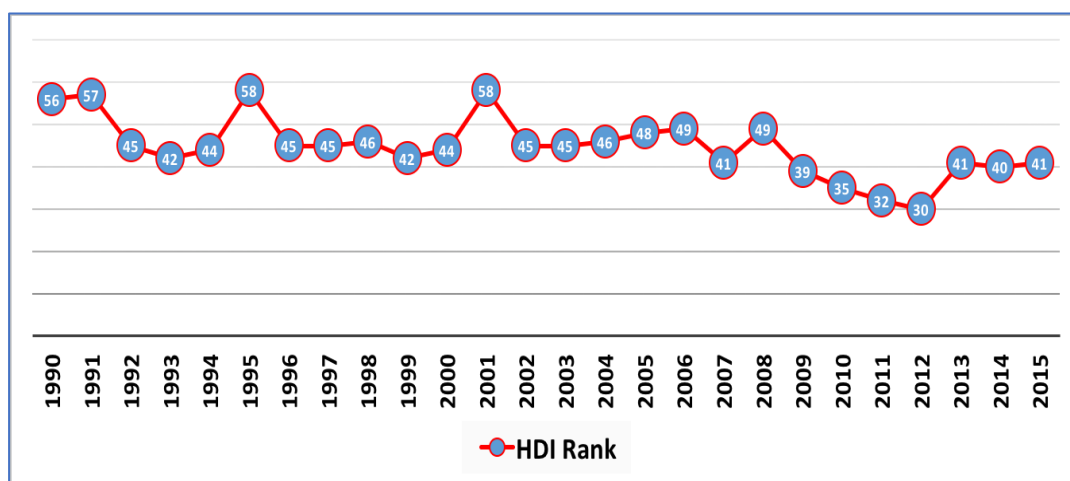
In this part of the dissertation, the reality of HD dimensions in the UAE is analysed. Human development figures of any state reflect the level of economic stability, social benefits, standard of living and security, which promotes stability and progress and move forward the strengthening of national investment and at the same time encourage foreign investments and encourage the use of people`s capabilities toward the country`s prosperity (Azman-Saini et al., 2010). Thus, nations are seeking to achieve the best possible levels for these indicators, which are reflected in the annual report of the UNDP. In HDR there are classification of countries with regards to human development in accordance with the rates of development and reform in the sectors of education, health, public freedoms, freedom of opinion and expression, human rights, and economic development, as the right to work and wages well to suit the level of living in the country (Alkire, 2010).

The UAE was able to achieve concrete and real results and successes in the Human Development Index (HDI). The approach for investigating this part, can take two different routes: (a) nationally over time and (b) internationally comparing figures with other countries, human development groups, and regions as well. The first level enables to explore the picture of human development in the UAE, and the other one enables to analyse the degree of human development compared with other parties (Shihab, 2001).

#### **4.1.1 UAE in the order of the HDI's ranking**

Figure 17 shows the rank of the UAE according to the HDI for the past 25 years since the implementation of this index, which occupies a high position among nations. Based on HDI reports that UAE's ranking was moving between (30) to (58) for the period from 1990 to 2014.

[Type here]



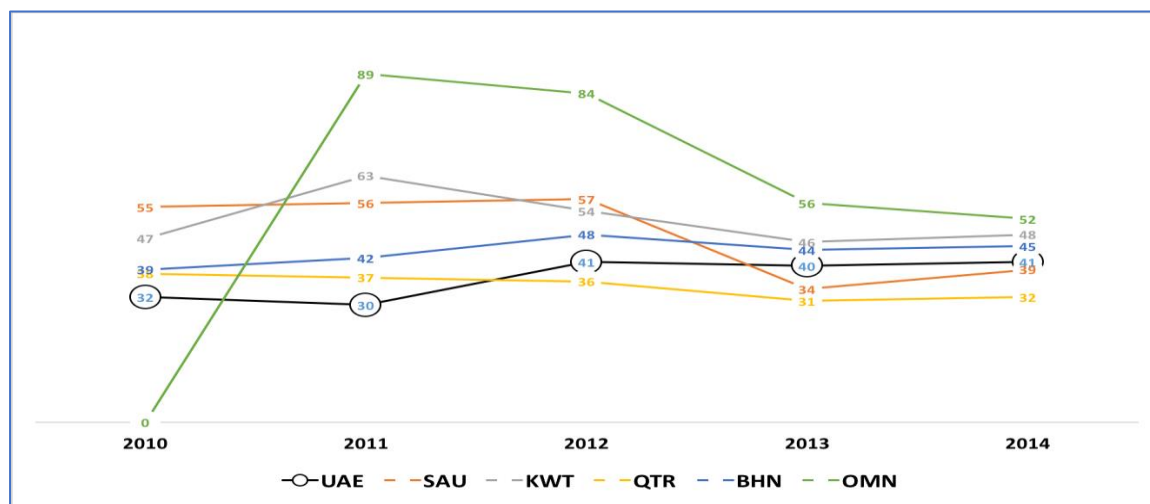
**Figure 17. UAE's HDI ranking history**

Source: UNDP, 2015 and selected data by author

According to the HDRs between years 2010 and 2011 the UAE was positioned in advanced rank, for example, in year 2010 it ranked 32, first among the Arab States at that time in the category of countries with very high human development. It also ranked before the neighboring countries such as Qatar, Bahrain, and Kuwait in the ranking 38, 39, and 47 respectively, and, Libya 53, Saudi Arabia 55, Tunisia 81, and Jordan 82 within the category of high human development. In the following year 2011, the UAE again ranked first place among Arab States and made two scores ahead to rank 30 of the total of 187 countries in the world. An estimate of the prestige and the outstanding achievements of the UAE in this year, and the achievements of the unprecedented ranking enabled it to lead the Arab States. At the global level, Norway, Australia, the Netherlands and the United States of America, New Zealand, Canada, Ireland, Liechtenstein, Germany, and Sweden were in the first ten, respectively, on the list of the classification of the HDR.

However, despite this progress in the Human Development Index 2014, the UAE dropped to the third position amongst the GCC countries (Figure 18) related to very high human development. In conclusion, since the adaptation of this indicator the UAE has always achieved leading positions among countries with a very high human development category.

[Type here]



**Figure 18. GCC's HDI Ranking**

Source: UNDP, 2015 and selected countries by author

#### 4.1.2 UAE in the order of the HDI's values

The HD report "*Work for Human Development*" published by the UN in 2015 notes that the UAE has made significant progress in all three levels of human development components including health care outcomes, education achievements, and gross national income (GNI) per capita advancing the HDI to the value of 0.835 and ranking 41 among 188 nations (Table 9 and Figure 19).

**Table 9. UAE's progress in HDI in 2014**

Country	Life expectancy at birth (year)	Expected years of schooling	Mean years of schooling	GNI per capita (2011 PPP\$)	HDI value
UAE	77	13.3	9.5	60,868	0.835
KSA	74.3	16.3	8.7	52,821	0.837
BHN	76.6	14.4	9.4	38,599	0.824
QAR	78	13.8	9.1	123,124	0.85
KWT	74.4	14.7	7.2	83,961	0.816
OMN	76.8	13.6	8	34,858	0.793
Arab States	70.6	12	6.4	15,722	0.686
Very high HDI	80.5	16.4	11.8	41,584	0.896
World	71.5	12.2	7.9	14,301	0.711

Source: (UNDP, 2015) and selected data by author

[Type here]

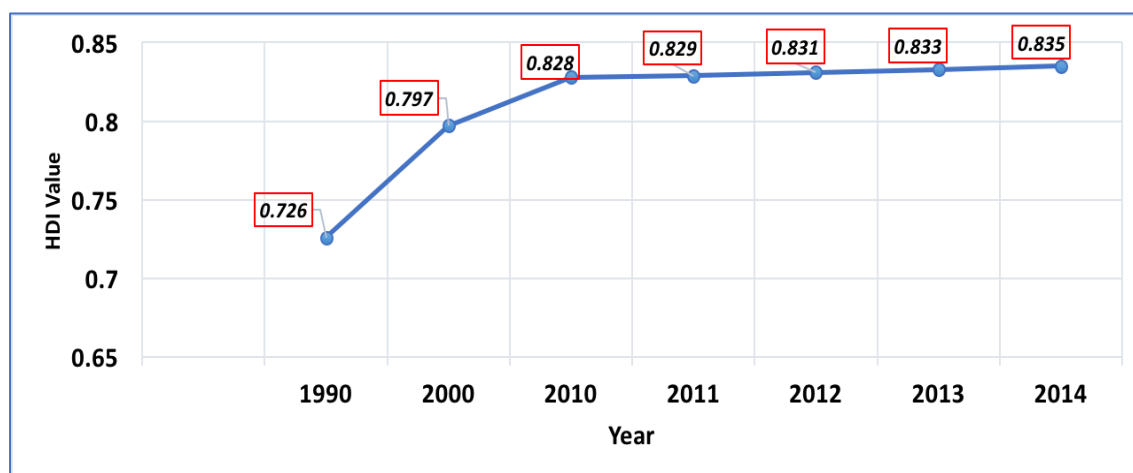
Also, the same report states that the UAE was able to achieve growth in the index, where in 1990 the index was at 0.726, and in 2014 became 0.835, an increase of 15.1% and an average annual increase of 0.59% between 1990 to 2014 (UNDP, 2015). In addition, the UAE's value of 0.835 was below the average value of very high human development countries with a value of 0.896, and above the average of Arab States with an index of 0.686. Based on global ranking for HDI, Qatar ranked 32 at the forefront of Arab States, followed by Saudi Arabia ranking 39, UAE ranking 41, Bahrain ranking 45 and Kuwait ranking 48. Other countries came in the high development category like Oman (52), Lebanon (67), Jordan (80), Algeria (83), and Tunisia (96). Historically, the average annual HDI growth rates were 0.94, 0.39, and 0.21 for classified periods (Table 10).

**Table 10. Average annual HDI growth**

Years	1990 - 2000	2000 – 2010	2010 - 2014	1990 - 2014
Value (%)	0.94	0.39	0.21	0.59

Source: (UNDP, 2015)

On the other hand, the HDI value can be expressed as well (Figure 19). The UAE made significant progress with regards to the three dimensions of HDI measurements by recording from 0.726 to 0.835 throughout the years 1990, 2000, 2010, 2011, 2012, 2013, and 2014 respectively. Therefore, it can be concluded that the country made a noticeable progress in HDI's components.



**Figure 19. United Arab Emirates' HDI value**

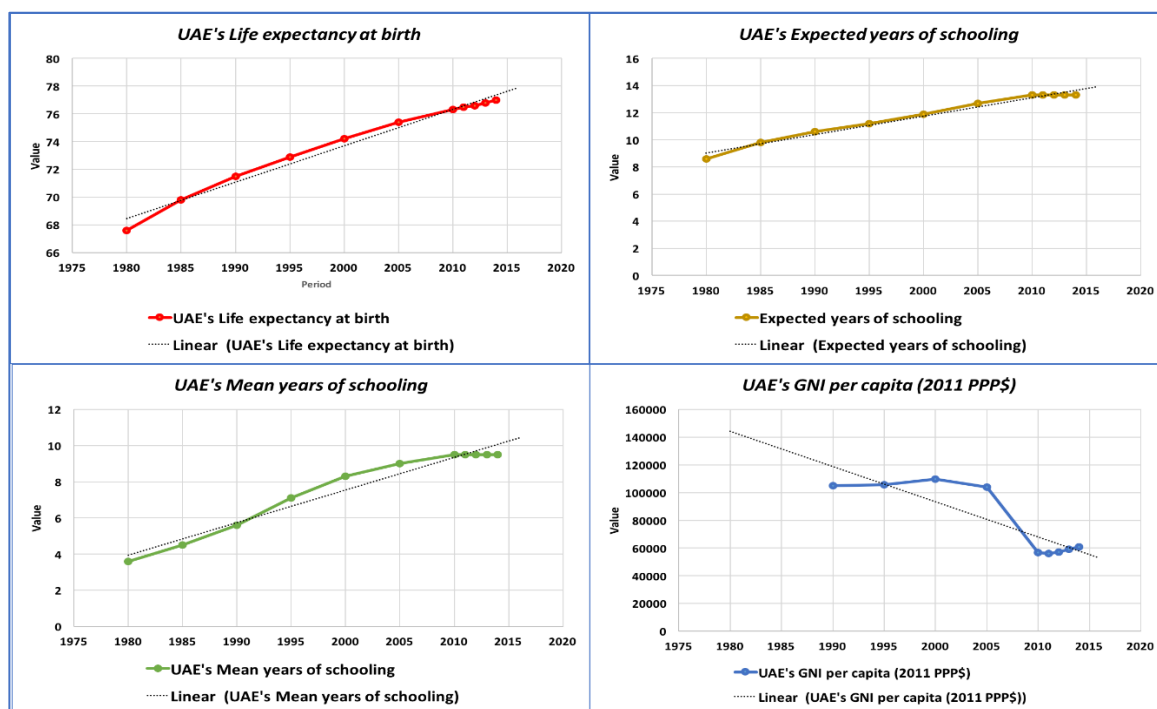
Source: UNDP, 2015

#### 4.1.3 The evolution of the HDI dimensions

The HDI reports in terms of health, education and standard of living were analyzed and evolved by an average of life expectancy at birth, the expected years of schooling, the mean years of schooling, and the gross national income per capita (Figure 20). According to a UNDP (2015)

[Type here]

report, which was launched in Ethiopia on September 14, 2015 and is shown in Figure 20, the average life expectancy at birth in the UAE rose from 67.6 years in 1980 to 77 years (an increase by 9.4 years) by 2014, the mean years of schooling increased from 3.6 in year 1980 to 9.5 (an increase by about 5.9 years) by 2014, and increased 4.7 years for expected years of schooling in the same period. On the other hand, the income indicator decreased in GNI per capita about 42.0% from year 1990 to year 2014.



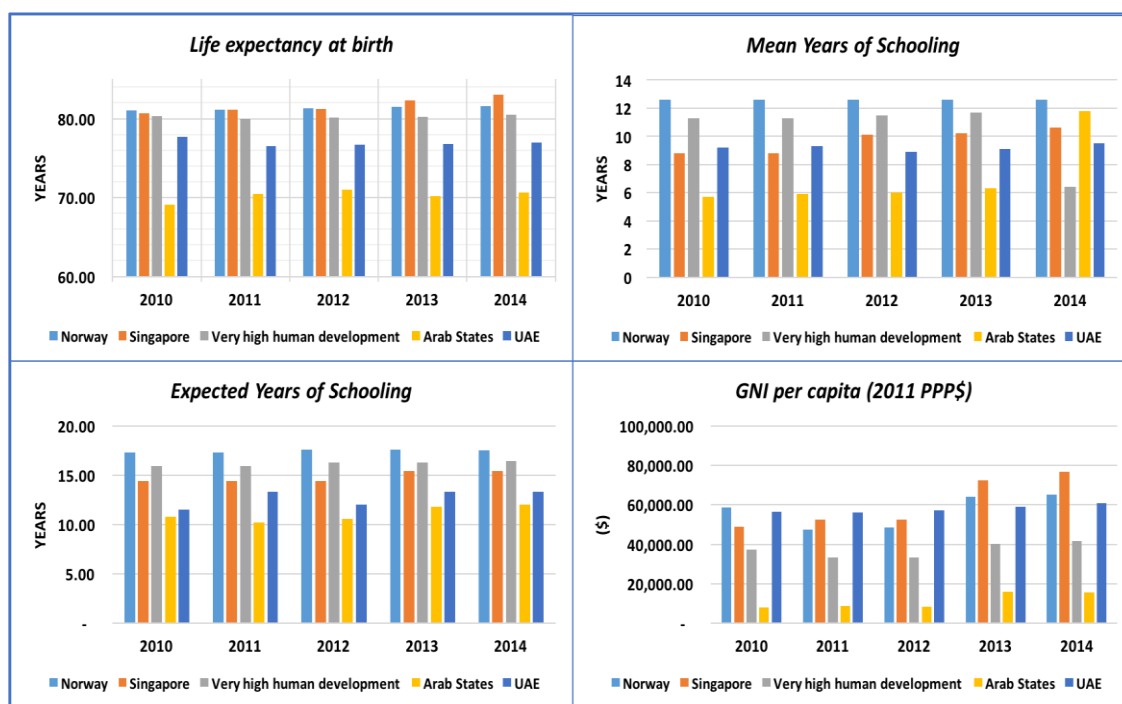
**Figure 20. UAE HD's Dimensions Trend (1980 - 2014)**

Source: UNDP, 2015 and data selected by author

With regards to HD dimensions for comparison groups from 2010 to 2014, it can be noted (Figure 21) that:

- Life expectancy at birth indicated that Singapore had the highest figure in 2013 and 2014, 82.3 and 83 years respectively.
- Norway had the highest figures related to expected years of schooling (17.50 years) and mean years of schooling (12.60 years) based on the comparison period among groups, knowing that this nation has always ranked (1) among all nations measured since the launch of this type of measurement.
- In GNI per capita the UAE is topping the comparison group, despite the GNI per capita trend-down since 2005.

[Type here]



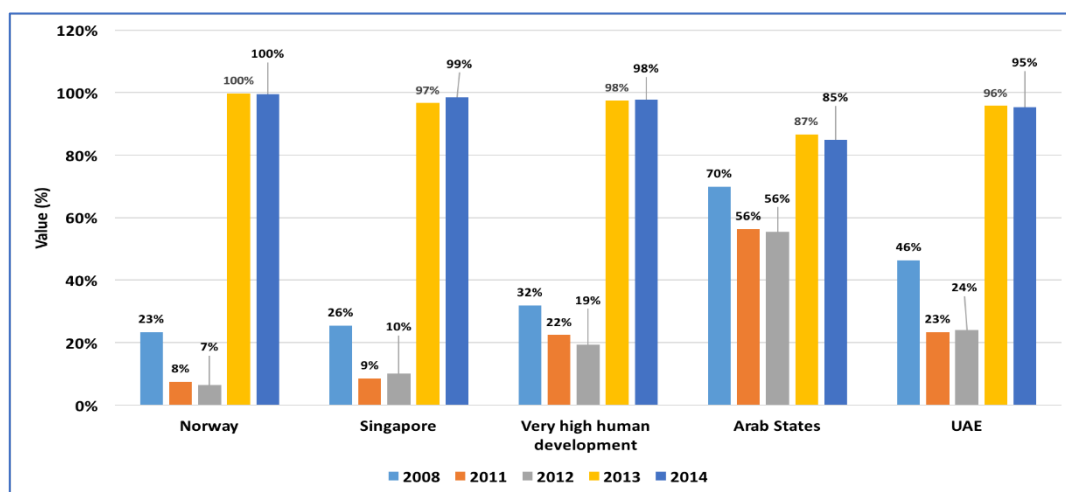
**Figure 21. A comparison of HD components from (2010 - 2014)**

Source: UNDP, 2015 and selected data by author

#### 4.1.4 Gender development index (GDI)

According to UNDP (2015) a new measurement approach was implemented with regards to sex-disaggregation, which is described as a proportion of the female to male ratio in HDI. Thus, GDI measures the gender inequalities in three fundamental measurements of human development as illustrated in Figure 22. GDI for the UAE between 2011 and 2014 noticed an improvement of around 72% in terms of inequalities between males and females. The values for females and males were 0.796 and 0.854 respectively, and the female-male ratio was 0.954, which is a close value compared with 0.978 for very high HDI. This process shows a national success in providing equal opportunities. In the same time period, the UAE was able to rank close to countries with better gender inequality practices (Figure 22), Norway, Singapore, Arab States, and UAE have a value of 100%, 99%, 85%, and 95% respectively.

[Type here]



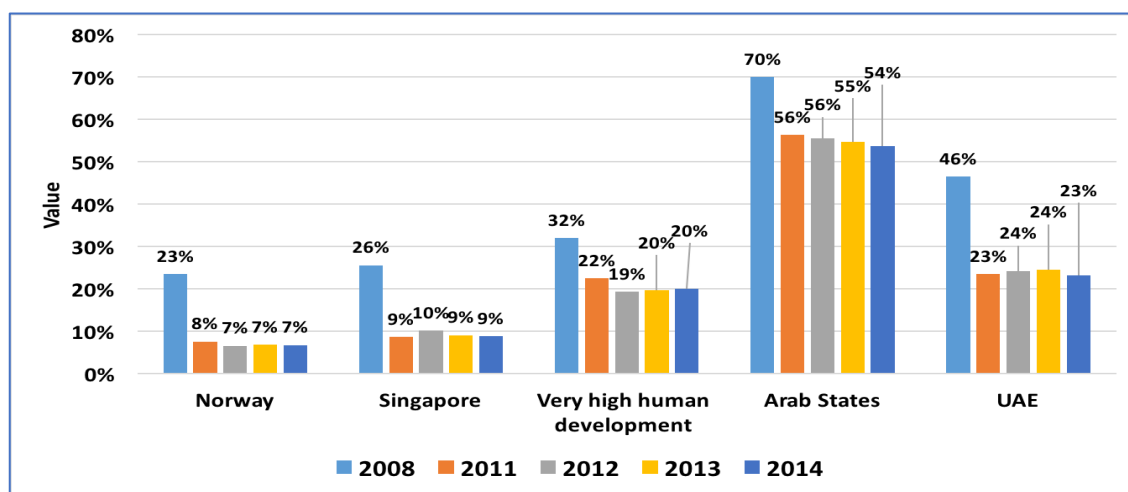
**Figure 22. Value rate (%) of Gender Development Index (GDI)**

Source: UNDP, 2015

#### **4.1.5 Gender Inequality Index (GII)**

GII shows the vulnerability of the national achievements in reproduction of health, empowerment, and economic activity. The health dimension is measured by adolescent birth rate and maternal mortality rate. Empowerment is measured by the number of seats held by females in national parliaments and education levels for each gender. Economic activity is measured by the participation rate of both sexes in the labour force. Therefore, the disparities guide numbers will represent the weak performance related to gender inequality. According to Figure 23, the UAE's value is indicating that the country needs to make more progress with regards to gender inequality. In 2014 GII values were 7%, 9%, 20%, 54%, and 23%, for Norway, Singapore (in very high human development group), Arab States, and UAE, respectively (UNDP, 2015). This index showed improvement for UAE from 46% in year 2008 to 23% in year 2014. Therefore, the movement of UAE's GII still needs more progress to move to a lower percentage than Norway, and Singapore.

[Type here]



**Figure 23. Gender Inequality Index (GII) Values**

Source: UNDP, 2015

Based on (UNDP, 2015), the average difference between genders was .317 in Europe and Central Asia, and 0.575 in Sub-Saharan Africa, and 0.197 in the group with very high HD, and 0.586 in the low HD group. According to UNDP (2014), women around the world face prejudice in the national political representation. The average share of the number of seats in national parliaments does not exceed 21%. The status of women in Latin America and the Caribbean is the best, where they occupy approximately 25% of the total number of seats, unlike the situation of women in the Arab world, where their share does not exceed 14% of the total number of seats in the National Arab Parliaments. Furthermore, the percentage of seats held by women in the UAE was 17.5% according to UNDP (2015) reports, which is considered better than the average in Arab States, while in Norway and Singapore these figures in 2014 were 39.6% and 25.3%, respectively (Table 11).

Education is measured by secondary school education from age 25 and older. In the UAE, the proportion of female education is higher than male, which was 73.1% to 61.2% for male in 2014. This difference in percentage indicates that females in the UAE have achieved the right to be educated. In 2010, this figure showed 76.9% and 77.3% for female and male, respectively. In addition to that, in Norway this figure was close to 97% for both sexes in 2014 (UNDP, 2010; UNDP, 2015).

Health care services in the form of maternal mortality rate are one of the most important factors contributing to the lack of care between the sexes, especially in developing countries. The rate of maternal mortality is up to 474 per 100,000 live births in Sub-Saharan Africa. Of course, leave and maternal mortality cause serious implications for infants and older brothers, who come from the parent without care (UNDP, 2015).

[Type here]

According to Table 11, in the UAE the rate was 8 for year 2014 compared to the period between 2003-2008 with a rate of 37 to 100,000 live births. This rate indicates the improvement in process for maternal mortality rate (UNDP, 2015). In comparison with very high HD groups and developed countries the rate was 4, 6, 18, and 155 in Norway, Singapore, and Arab States, respectively. Adolescent birth may in turn leave dire consequences on the situation of young mothers and their babies. For example, Sub-Saharan Africa is witnessing major 110 births per 1,000 young mothers in the age group 15-19 years (UNDP, 2015). Based on Table 11, the rate of adolescent birth was 27.5 in every 1,000. Between 1990-2008 the rate was 16.0 in UAE, which reflects improvement processes toward this measurement compared to Norway, Singapore, and Arab States with very high HD with 7.8, 6, 19, 45.4, respectively.

On the other hand, it is related to economic activity. In terms of labour force participation, the UAE rate was 46.5 for females and 92.0 for males in 2014. The rate for females showed an improvement from 2010 with a rate of 42.5 (UNDP, 2010). In conclusion, the UAE have made an improvement related to GII (UNDP, 2015).

**Table 11. Gender Inequality Index (GII)'s Dimensions in 2014**

	Maternal mortality ratio (%)	Adolescent birth rate	Female seats in parliament (%)	Population with at least some secondary		Labour force participation rate (%)	
				Female	Male	Female	Male
<b>UAE</b>	8	27.6	17.5	73.1	61.2	46.5	92
<b>Norway</b>	4	7.8	39.6	97.4	96.7	61.2	68.7
<b>Singapore</b>	6	6	25.3	74.1	81	58.8	77.2
<b>Very high HDI</b>	18	19	26.5	86.2	87.9	52.1	68.7
<b>Arab States</b>	155	45.4	14	34.7	47.6	23.2	75.3

Source: (UNDP, 2015)

#### **4.1.6 Multidimensional Poverty Index (MPI)**

Conventional measures of poverty are based on income and consumption. There are multiple aspects of poverty measured by multi-dimensional poverty. For example: exposed people from the deterioration of the health situation and malnutrition, low level of education and skills, lack of livelihoods, the deterioration of family home state, and social exclusion (Worldbank, 2012). The uses of the multidimensional poverty index (MPI) started in 2010. According to 2014 Human

[Type here]

Development Report, 1.2 billion people live on \$1.25 a day in 104 developing countries. The number of people who suffer from multiple dimensions of poverty in 91 developing countries is close to 1.5 billion based on the MPI (UNDP, 2015). In conclusion, MPI reports do not include the UAE because data are unavailable.

#### **4.1.7 Education achievements**

There is a positive relationship between education and economic growth as well (Savvides & Stengos, 2008). There is no doubt that education and training is considered as one of the major determinants of increasing productivity (Shihab, 2001), and it is considered as a key factor to growth and modernisation as well. In the UAE, education is free for citizens and Arabic speaking guest workers employed in the public sector (UAE, 2013). Thus, educational statistics in the UAE (UNDP, 2015) indicate that literacy rates from 2005 to 2014 between the age of 15-24 were on average 90% and 97% for females and males, respectively. In comparison with Singapore for the same period the same rates were 96.4% and 99.8% for females and males, respectively. According to the UAE (2013), the education sector was awarded with a budget of 8.2 billion Dirham in 2012 and 9.9 billion Dirham was allocated for the education sector in the UAE in 2013, which amounts to around 22% and means that a large share of the federal budget was assigned to education for the year 2013 (UAE, 2013).

The education system in the UAE consists of public and private institutions established in the early 1970s. The system is a four-tier system that covers 14 years of education, which is compulsory for all UAE citizen students. On the other hand, higher education including colleges and universities consists of undergraduate and graduate programs. The higher governmental bodies provide scholarships for UAE's citizens including the choice to study inboard or outboard. The education sector in the UAE remains a source of attention by the government with full care. According to Table 12, the growth in the total number of schools, classes, teachers, and students in both public and private were 4%, 72%, 98%, and 69%, respectively from the year 2000 to 2014.

**Table 12. UAE's public and private educational services indicators for year 2000 and 2014**

<b>Period</b>	<b>No. of schools</b>	<b>No. of classes</b>	<b>No. of teachers</b>	<b>No. of students</b>
<b>2000</b>	1,167	24,114	45,442	568,791
<b>2014</b>	1,215	41,406	89,772	961,606
<b>Change (%)</b>	<b>4</b>	<b>72</b>	<b>98</b>	<b>69</b>

[Type here]

Source: Education Ministry, Moe report (2005-2010). (FCSA, 2015). Estimated teachers number (2014), base in growth rate from (2005-2010). Data selected by author

As mentioned in UNDP (2015), the dropout rate in primary schools in the UAE for the period 2008-2014 was 8% from total students in this stage, which is close to the rate of 8.8% in other Arab States. Thus, this indicator needs more attention because in countries such as Norway and Singapore for the same period the rate was 1.5% and 1.3%, respectively. The number of pupils per teacher in the UAE was 16 students and in the very high HD category this figure was 14 students (Table 13) (UNDP, 2015).

**Table 13. Education achievements (2008-2014)**

<b>Education achievements</b>	<b>Norway</b>	<b>Singapore</b>	<b>Very high HD</b>	<b>Arab States</b>	<b>UAE</b>
<b>Primary schooling dropout rate (%)</b>	1.5	1.3	2	8.8	<b>8</b>
<b>Pupil-teacher ratio (%)</b>	-	17	14	23	<b>16</b>

Source: (UNDP, 2015)

#### **4.1.8 Health outcomes**

Health services are at the forefront of the comprehensive national action by the UAE where these services play a positive impact in the process of development, construction, and social stability (Moh, 2016). The Ministry of Health provides to all citizens and residents a comprehensive health care, which can be reached through preventive and therapeutic programs with a service network at all levels such as primary health care, secondary care, and clinical health care. The health care at all levels is free of charge for all citizens.

During the past two decades, modern hospitals were set up that are no less efficient in performance than many of the world's hospitals, whether in Europe or America (UAE, 2013). The country has developed the old institutions providing them with superior expertise, modern tools, and technical and administrative personnel. The UAE has established laboratories that rely on integrated capabilities to contribute to the proper and accurate diagnosis of the disease. Furthermore, centers for nuclear medicine, physiotherapy and psychiatry were also established for the first time (UAE, 2013).

[Type here]

The number of hospitals has increased by 29%, the number of beds by 64%, the number of physicians by 303%, and the number of nurses has increased by 225% from 2000 to 2014 (Table 14).

**Table 14. UAE's healthcare infrastructure**

Period	No. of Hospitals	No. of Beds	No. of Physicians	No. of Nurses
2000	28	4,568	1,604	5,097
2014	36	7,493	6,504	16,547
<b>Change (%)</b>	<b>29</b>	<b>64</b>	<b>305</b>	<b>225</b>

Source: (FCSA, 2015; FCSA, 2016)

The country made significant progress in terms of health care (UNDP, 2015). For example, comparing to Singapore for physicians per 10,000 people at equal 19.2 physicians on average, the UAE has improved the number of physicians to 19.3 as average according to a 2014 HD report, where it was 15 physicians as average per 10,000 people in the 2010 HD report. The country needs to target mortality for adults, infants, and under-five year olds by improving it in line with Norway or Singapore (Table 15). In conclusion, the UAE is considered an advanced country compared to Arab States.

**Table 15. Health outcomes HDR in 2015**

Country	Mortality rates (per 1,000 live births)		Adult mortality rate (per 1,000 people)		Physicians (per 10,000 people)	Public health expenditure
	Infant (2013)	Under-five (2013)	Female	Male	(2001-2013)	(% of GDP)
Norway	2.3	2.8	47	73	37.4	9.6
Singapore	2.2	2.8	38	69	19.2	4.6
UAE	7	8.2	59	84	19.3	3.2
Very high HD	5.1	6	57	106	27.9	12.2
Arab States	28.6	37.6	124	172	13.8	4.1

Source: (UNDP, 2015)

[Type here]

In conclusion, in the perspective of national and international comparison through analysis of the reality of HD reports that found that, the UAE has always held leading positions among the countries with a high human development category. Significant results from the national level showed that the UAE improved from 1980 to 2014 in four HDI dimensions, an increase of 9.4 years, in average life expectancy at birth of 77 years in 2014, an average of 5.9 years in the mean years of schooling, about 4.7 years raised in the expected years for schooling, but GNI per capita fell by 42% for the period 1990-2014. In terms of international perspective, the UAE recorded better figures than the Arab States from 2010-2014. Singapore had the highest number among the comparison group in the average life expectancy at birth. The mean years of schooling and expected years of schooling Norway has been classified (1) among all countries since the development of this measurement. But the UAE tops the comparison group in GNI per capita. In addition, noticed that the UAE in mean years of schooling of the years 2010 and 2011 was higher than Singapore.

In terms of gender inequality, the GDI index for the UAE between 2011 and 2014 showed a 72% improvement. The ratio between females and males was 0.954, close to 0.978 compared with very high HDI. UAE ranking close to countries with better gender inequality practices, where UAE, Singapore, Norway, Singapore, Arab States, and UAE have a value of 100%, 99%, 85%, and 95% respectively. In 2014, the GII values were 7%, 9%, 20%, 54%, and 23%, for Norway, Singapore (in a very high human development group), Arab States, and UAE, respectively. Thus, the UAE's value is indicating that the country needs to make more progress with regards to gender inequality. In addition, the percentage of seats held by women in the UAE parliament was 17.5%, which is better than the average in the Arab countries, which is about 14%. While in Norway and Singapore these figures in 2014 were 39.6% and 25.3%, respectively.

In the perspective of education, where education is measured through secondary education from the age of 25 and above. In the UAE, the female education rate was higher than that of males from 73.1% to 61.2% for males in 2014, indicating that females in the UAE have the right to education. In Norway, this figure was close to 97% for both sexes in 2014. In addition, the total number of schools, classrooms, teachers, and students in the public and private sectors was 4%, 72%, 98% and 69%, respectively, from 2000 to 2014, indicating a high rate of increase of teachers compared to students and classrooms. The dropout rate in primary schools in the UAE for the period 2008-2014 was 8% of the total students at this stage, which is close to 8.8% in other Arab States. Therefore, this indicator needs more attention because in countries such as Norway and Singapore for the same period, the rate was 1.5% and 1.3%, respectively.

[Type here]

Healthcare in the terms of maternal mortality is a major aspect that has a contribution lack of gender care, mostly in developing nations. In terms of maternal mortality, the rate indicates an improvement in the operation in the UAE, where the rate was 8 in 2014 compared with 2003 to 2008 with a rate of 37 to 100,000 live births. At the international level, compared to the developed countries and the very high HD groups, the average was 4, 6, 18 and 155 in Norway, Singapore, and the Arab states, respectively. The average birth rate of the adolescent was 27.5 per 1000, between 1990 and 2008 the rate was 16.0 in the UAE, which reflects improvements towards this capacity compared to Norway, Singapore, and the Arab States with very high HD with 7.8, 6, 19, 45.4 respectively. In addition, the hospitals' figure augmented by 29%, beds' figure grew by 64%, the doctors' number rose by 303% and the nurses' number rose by 225% from 2000 to 2014, indicating that health services are at the lead of the national inclusive work in the country. Also, compared to Singapore for 10,000 people on an average parity of 19.2 doctors, the UAE improved the number of doctors to 19.3 as an average, indicating a significant improvement, with 15 doctors averaging every 10, 000 people in 2010. The country needs to target mortality for adults, infants, and under-five-year-olds by improving them in line with Norway or Singapore.

On otherside, the UAE has a high level of development compared to high-income countries. The hypothesis testing ( $H_1$ ), says, that if a country has a high level of development, it corresponds to a higher trend of productivity based on the Rostow (1960) stage of development hypothesis (Mustafa, 2013). In fact, due to the country's economic growth it is considered to be a high-income country and has seen remarkable growth in various areas. However, the total factor productivity, was found to be poor in the UAE. Therefore, a high level of development did not match the high level of TFP in the UAE in the period 1990-2015, the UAE economy can be explained in the first stage of development. Thus, the hypothesis was rejected.

## **4.2 Growth accounting of sectoral approach**

Table 16, Figure 24, and Figure 25 describe the calculation for each economic sector (primary, secondary, and tertiary) as classified in long panel-data from 1990-2015 and in group of period of time from 1990-2000, 2000-2010, and 2010-2015. In comparing the sectors by average annual growth rate, from 1990 to 2015 the tertiary sector grew faster in GDP output compared to the primary and the secondary sectors with 8.37% in the tertiary sector and 6.7% and 6.88% for the primary and the secondary sector, respectively.

[Type here]

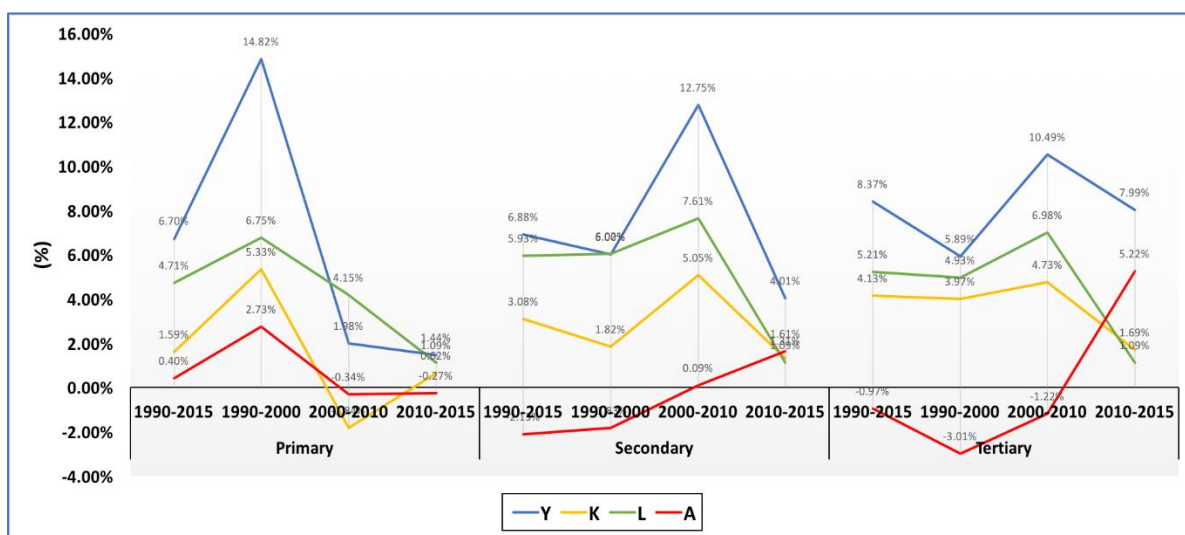


Figure 24. UAE's average annual growth (%) by major economic sectors

Source: own calculations or based on data from FCSA

In the period of 1990-2000 the average growth rate grew faster in the primary sector by 14.82% compared to the secondary and the tertiary sectors with 6.0% and 5.89%, respectively (Figure 24). Between 2000-2010 the secondary sector grew by 12.75%, followed by the tertiary sector with 10.49%. From 2010 to 2015 the tertiary sector grew by 7.99%, followed by the secondary sector with 4.01% and the primary sector with 1.4%. The development of average annual growth rate was mainly generated from the primary sector in 1990-2000, then from the secondary sector in 2000-2010, and finally from the tertiary sector in 2010-2015. In general, tertiary sector followed by the secondary sector grew faster from 1990 to 2015.

In addition, such a result is an important record, that the share of growth due to capital and labour declined in the tertiary sector and the secondary sector unlike in the primary sector, where it increased. The reason behind this is directed investment in a costly and unproductive sector or it is a new trend of the country to give more attention to the primary sector.

[Type here]

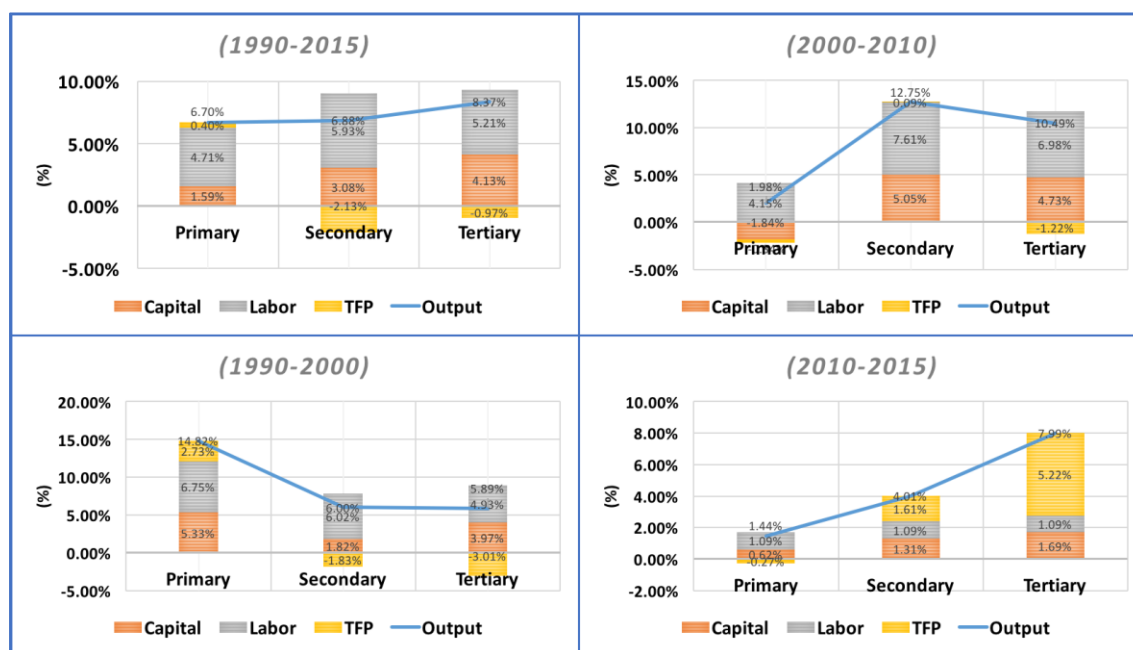
**Table 16. Growth Accounting calculation for economic sectors from (1990-2015)**

Average Annual growth rates					Share of growth due to:		
Primary sector	Y	K	L	A	K	L	A
<b>1990-2015</b>	6.70%	1.59%	4.71%	0.40%	24%	70%	6%
<b>1990-2000</b>	14.82%	5.33%	6.75%	2.73%	36%	46%	18%
<b>2000-2010</b>	1.98%	-1.84%	4.15%	-0.34%	-93%	210%	-17%
<b>2010-2015</b>	1.44%	0.62%	1.09%	-0.27%	43%	75%	-19%
Secondary sector	Y	K	L	A	K	L	A
<b>1990-2015</b>	6.88%	3.08%	5.93%	-2.13%	45%	86%	-31%
<b>1990-2000</b>	6.00%	1.82%	6.02%	-1.83%	30%	100%	-31%
<b>2000-2010</b>	12.75%	5.05%	7.61%	0.09%	40%	60%	1%
<b>2010-2015</b>	4.01%	1.31%	1.09%	1.61%	33%	27%	40%
Tertiary Sector	Y	K	L	A	K	L	A
<b>1990-2015</b>	8.37%	4.13%	5.21%	-0.97%	49%	62%	-12%
<b>1990-2000</b>	5.89%	3.97%	4.93%	-3.01%	67%	84%	-51%
<b>2000-2010</b>	10.49%	4.73%	6.98%	-1.22%	45%	66%	-12%
<b>2010-2015</b>	7.99%	1.69%	1.09%	5.22%	21%	14%	65%

Source: own calculations based on data from FCSA

In terms of capital accumulation, the tertiary sector had the highest annual average growth between 1990-2015 with 4.13%, followed by the secondary sector with 3.08% and by the primary sector with 1.59 % (Table 16). On the other hand, from 1990 to 2000 this rate was the highest with 5.33% in the primary sector. Furthermore, from 2000 to 2010 the secondary sector showed the highest rate with 5.05% The average annual growth rate for labour grew between 1.09% and 7.61 in all sectors, however, the labour input was higher compared to the capital accumulation. Thus, the secondary sector demonstrated the highest figure of almost 6% compared to 5.21% and 4.71% in the tertiary and the secondary sector, respectively. From 2010 to 2015 the technology factor was mostly given negative figures unlike the tertiary sector with a growth rate of 5.22%. The annual average growth in labour was the highest in all sectors at different periods of times. In addition, TFP grew between 2010-2015 in the tertiary sector.

[Type here]



**Figure 25. Source of growth (%) by major economic sectors**

Source: own calculation based on data from FCSA

It can be concluded that from 1990 to 2015 the contribution to output growth share was driven by labour in all sectors and periods of time. In the examined period the share of growth due to labour was 70%, 86%, and 62% as compared to the share of growth due to capital in the same period with 24%, 45%, and 49% for the primary, the secondary, and the tertiary sectors, respectively. The share of growth due to capital and labour declined in the tertiary sector and the secondary sector unlike in the primary sector, where it increased. TFP showed negative figures with the exception of the primary sector. In addition, the TFP share of growth factors, from 2010 to 2015, was positive in the secondary and tertiary sectors. Another fact is that the share of growth due to TFP was higher compared to capital and labour where the rates were 65% and 40% in the tertiary and the secondary sectors (Table 16), respectively, from 2010-2015.

Therefore, the hypothesis testing  $H_2$ , indicates that the primary sector had a significant contribution on economic growth from the beginning of the examined period, specifically from 1990 to 2000. Thus, the hypothesis was accepted.  $H_3$  was rejected because the source of growth that had a higher growth rate was labour in both secondary and tertiary sectors. In comparison the contribution rate of labour and capital was 70%, 86%, and 62% and 24%, 45%, and 49% respectively for the primary, secondary, and tertiary sectors from 1990 to 2015. Thus, the economic sectors of the UAE were a labour-intensive. In the same context, the secondary sector was not the engine of economic growth from 1990-2015, because the tertiary sector contributed

[Type here]

8.37% to the economic growth, followed by the secondary sector with 6.88% contribution from 1990 to 2015, but the tertiary sector was more productive than the secondary sector.

In conclusion, the path of development of three sectors started with the primary sector from the period 1990-2000, then continued with the secondary sector between 2000-2010, and lastly with the tertiary sector in the period 2010-2015. In general, the tertiary sector was the leader in terms of contribution to growth, followed by the secondary sector between 1990-2015. The contribution of labour significantly impacted the output growth in all sectors due to the increase in the number of workers not to the improvement in TFP. In addition, the growth share of capital accumulation in comparing to three major economic sectors was higher in the secondary and tertiary sectors indicating the huge investment that took place in these sectors.

### **4.3 Growth accounting of industry approach**

#### **4.3.1 Secondary industries**

The results of growth accounting of the secondary industries were divided into groups of periods of times (1990-2015, 1990-2000, 2000-2010, and 2010-2015) from 1990 to 2015 (Table 17, Figure 26, and Figure 27). The secondary sector included four industries, namely MQ, MFG, EGW, and CN. The results are divided into two dimensions: average annual growth rate related to industry output, capital, labour and TFP, and share of growth due to capital, labour and TFP.

From 1990 to 2015 the average annual growth rate of the industry's output recorded 9.05% as the maximum, and 5.38% as the minimum (Figure 26 and Table 17). For the MFG industry the highest growth rate was 9.05% compared to CN, MQ, and EGW with 7.96%, 5.94%, and 5.38%, respectively. From 1990 to 2000 the MFG showed the highest annual growth rate with 12.76% compared to EGW, CN, and MQ industries recording 6.29%, 5.54%, and 4.10%, respectively. The MQ deserved the highest average growth with 15.09%, followed by the EGW with 13.70% and CN with almost 12%. From 2010 to 2015 the MFG showed a higher average growth rate with 7.47% compared to MQ and CN unlike the EGW recording negative growth with -11.36%.

[Type here]

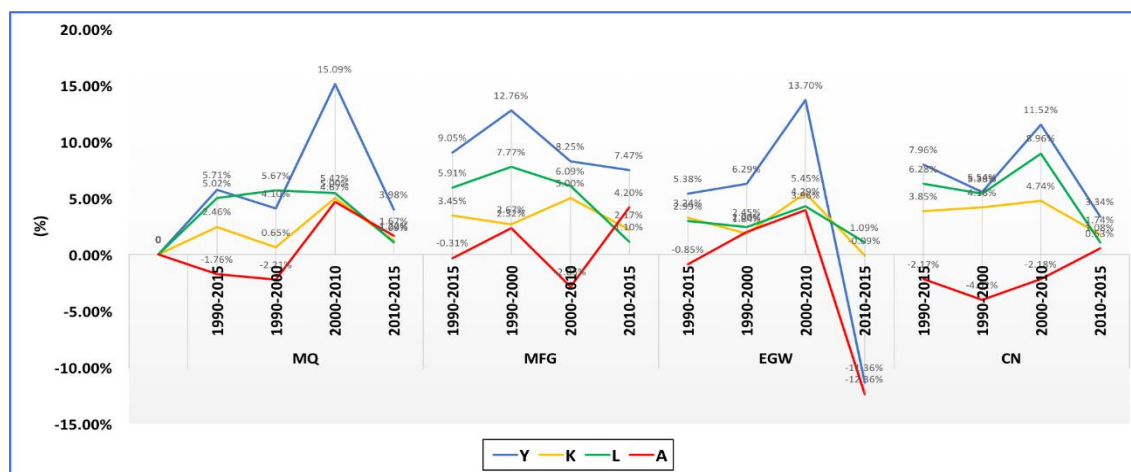


Figure 26. UAE's average annual growth (%) for secondary industries

Source: own calculations based on data from FCSA

Table 17. Growth accounting results of the secondary sectors

Average Annual Growth Rates					Share of Growth Due to:		
Industry	Y	K	L	A	K	L	A
<b>MQ Industry</b>							
1990-2015	5.94%	2.55%	5.22%	-1.83%	43%	88%	-31%
1990-2000	4.10%	0.65%	5.67%	-2.21%	16%	138%	-54%
2000-2010	15.09%	5.00%	5.42%	4.67%	33%	36%	31%
2010-2015	3.98%	1.22%	1.09%	1.67%	31%	27%	42%
<b>MFG Industry</b>							
1990-2015	9.05%	3.45%	5.91%	-0.31%	38%	65%	-3%
1990-2000	12.76%	2.67%	7.77%	2.32%	21%	61%	18%
2000-2010	8.25%	5.00%	6.09%	-2.85%	61%	74%	-35%
2010-2015	7.47%	2.17%	1.10%	4.20%	29%	15%	56%
<b>EGW Industry</b>							
1990-2015	5.38%	3.24%	2.99%	-0.85%	60%	56%	-16%
1990-2000	6.29%	1.84%	2.45%	2.00%	29%	39%	32%
2000-2010	13.70%	5.45%	4.29%	3.96%	40%	31%	29%
2010-2015	-11.36%	-0.09%	1.09%	-12.36%	1%	-10%	109%
<b>CN Industry</b>							
1990-2015	7.96%	3.85%	6.28%	-2.17%	48%	79%	-27%
1990-2000	5.54%	4.18%	5.38%	-4.02%	75%	97%	-73%
2000-2010	11.52%	4.74%	8.96%	-2.18%	41%	78%	-19%
2010-2015	3.34%	1.74%	1.08%	0.53%	52%	32%	16%

Source: (FCSA, 2016) and own calculations

[Type here]

The annual average growth rate of capital fluctuated between 2.55% in the MQ and 3.85% in the CN, and for labour it varied between 2.99% in EGW and 6.28% in CN, and the growth rate of TFP varied between -2.17% in the CN and -0.31% in the MFG industries. In addition, such a result is an important record, the secondary industries, the average annual growth rate for labour in MFG industry noticed declined, where recorded 7.8% between 1990-2000, 6.1% between 2000-2010, and 1.1% in 2011-2015. Average capital growth rate, the downward trend was observed in all secondary industries specifically after 2010.

In general, the capital average growth rate showed high figures in MFG and CN for most periods of times, the CN showed high average growth in all periods of times in terms of labour. Nevertheless, from 2010 to 2015 all secondary industries declined with regards to their figures related to labour. The average growth rates of TFP from 2010 to 2015 showed a better performance but the EGW showed a negative growth rate of -12.36% compared to 1.67%, 4.20%, and 0.53% for MQ, MFG, and CN, respectively.

As illustrated in Table 17, from 1990 to 2015 the share of capital growth fluctuated between 60% as the highest in EGW and 38% as the lowest in the MFG. The growth share contributed by labour was 88% in MQ and 56% in the EGW. The growth contribution of TFP varied between -3% in the MFG and -31% in the MQ (Table 17 and Figure 27). Therefore, it can be concluded in long-term analysis that EGW, MQ, and MFG contributed more by inputs in sequence to capital, labour and TFP, respectively.

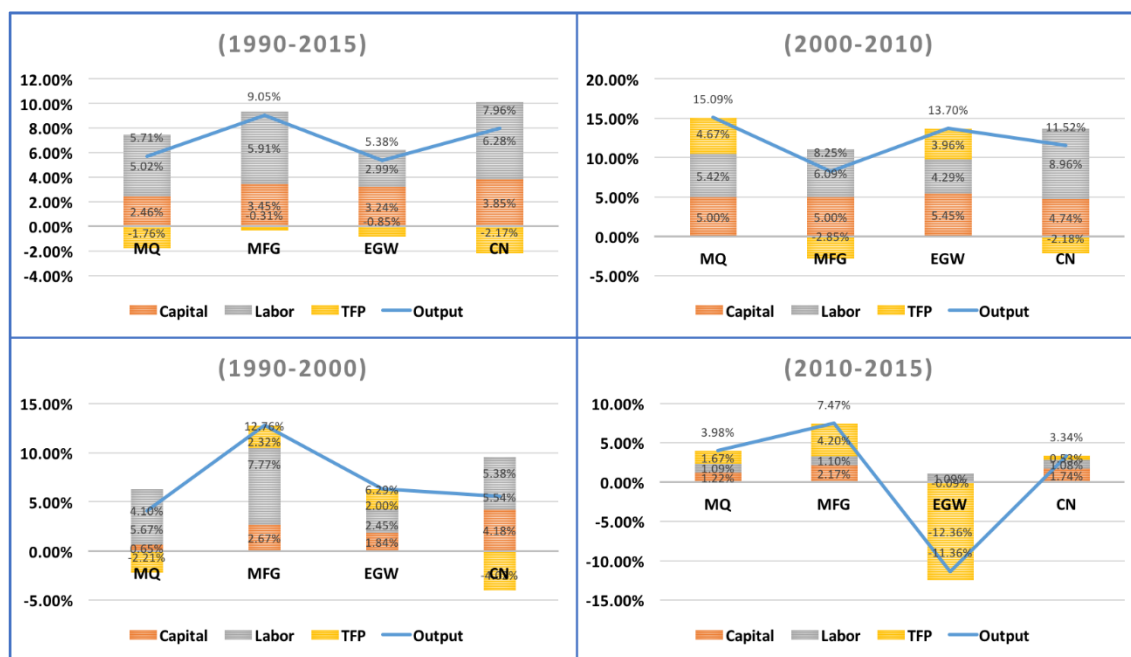


Figure 27. Source of growth (%) for secondary industries

Source: own calculations based on data from FCSA

[Type here]

From 1990 to 2000 the growth share of labour was the highest in MQ and was followed by CN, with results of 138% and 97%, respectively. In general, the CN and MFG achieved a relatively high growth rate due to the labour in most periods of time (Table 17). It is worth mentioning that TFP performance was positive in all industries from 2010 to 2015 with 42%, 56%, 109%, and 16% for MQ, MFG, EGW, and CN, respectively, along with the decline in the growth share of labour in all sectors. Proper management of labour will help to improve the performance of TFP.

To sum it up, in the long-term analysis the MFG contributed significantly to the sector's output resulting in an average annual growth rate of 9.05%, 12.76%, 8.25%, and 7.47%, for 1990-2015, 1990-2000, 2000-2010, and 2010-2015, respectively. Thus,  $H_4$  was rejected because the MFG achieved 9.05% compared to 5.94% in MQ indicating that the UAE's economy was more diversified and relied less on the oil production. Furthermore, the average annual growth rate for MQ was less compared to MFG or even CN, where the rates were 5.94%, 4.10%, 15.09%, and 3.98%, for 1990-2015, 1990-2000, 2000-2010, and 2010-2015, respectively. Thus, the diversification strategy of the country gained its benefit by decreasing dependence on the oil industry, and the MFG witnessed its contribution to secondary sector's output. In addition, the results showed that there is an inverse relationship between TFP and the percentage of the increasing number of workers, where the lower the number of workers the better TFP performance and vice versa. Therefore, the management of the number of workers will help the performance of TFP.

#### **4.3.2 Tertiary Industries**

The results of growth accounting of industries of the tertiary sector from 1990 to 2015 are divided into groups of periods of times, namely 1990-2000, 2000-2010, and 2010-2015 (Table 18, Figure 28, and Figure 29). The industries of the service sector with seven industries are WRTRS, RH, TSC, REBS, SPS, FCS and GS. Table 18 and Figure 28 describe the annual average growth rate for each economic industry and the share of growth due either to capital, labour or TFP.

[Type here]

**Table 18. Growth accounting results of the tertiary industries**

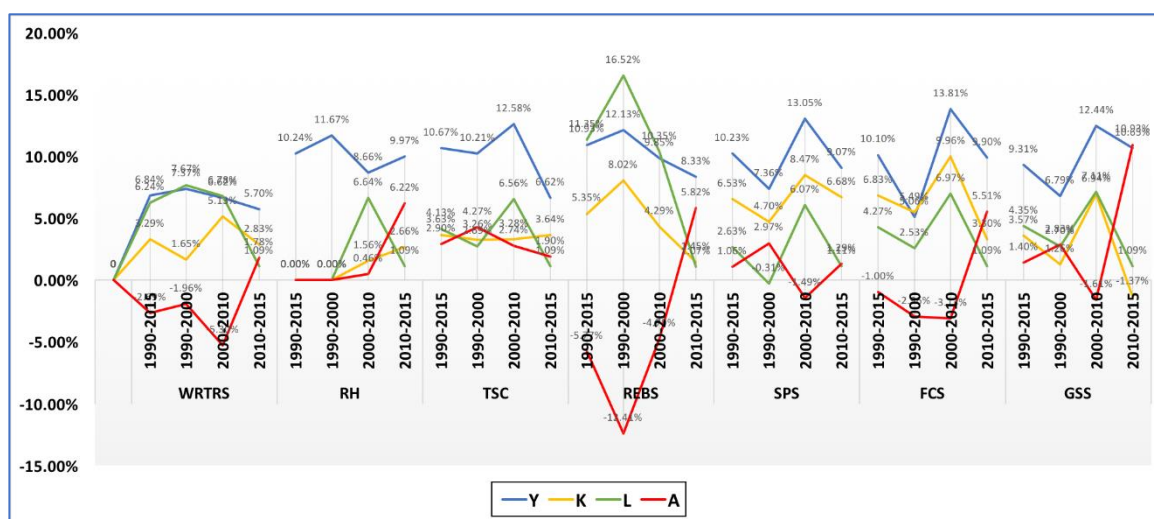
Average annual growth rates					Share of growth due to:		
WRTRS industry	Y	K	L	A	K	L	A
<b>1990-2015</b>	6.84%	3.29%	6.24%	-2.69%	48%	91%	-39%
<b>1990-2000</b>	7.37%	1.65%	7.67%	-1.96%	22%	104%	-27%
<b>2000-2010</b>	6.62%	5.13%	6.78%	-5.30%	78%	103%	-80%
<b>2010-2015</b>	5.70%	2.83%	1.09%	1.78%	50%	19%	31%
RH industry	Y	K	L	A	K	L	A
<b>1990-2015</b>	10.24%	-	-	-	-	-	-
<b>1990-2000</b>	11.67%	-	-	-	-	-	-
<b>2000-2010</b>	8.66%	1.56%	6.64%	0.46%	18%	77%	5%
<b>2010-2015</b>	9.97%	2.66%	1.09%	6.22%	27%	11%	62%
TSC industry	Y	K	L	A	K	L	A
<b>1990-2015</b>	10.67%	3.63%	4.13%	2.90%	34%	39%	27%
<b>1990-2000</b>	10.21%	3.26%	2.69%	4.27%	32%	26%	42%
<b>2000-2010</b>	12.58%	3.28%	6.56%	2.74%	26%	52%	22%
<b>2010-2015</b>	6.62%	3.64%	1.09%	1.90%	55%	16%	29%
REBS industry	Y	K	L	A	K	L	A
<b>1990-2015</b>	10.93%	5.35%	11.35%	-5.77%	49%	104%	-53%
<b>1990-2000</b>	12.13%	8.02%	16.52%	-12.41%	66%	136%	-102%
<b>2000-2010</b>	9.85%	4.29%	10.35%	-4.79%	44%	105%	-49%
<b>2010-2015</b>	8.33%	1.45%	1.07%	5.82%	17%	13%	70%
SPS industry	Y	K	L	A	K	L	A
<b>1990-2015</b>	10.23%	6.53%	2.63%	1.06%	64%	26%	10%
<b>1990-2000</b>	7.36%	4.70%	-0.31%	2.97%	64%	-4%	40%
<b>2000-2010</b>	13.05%	8.47%	6.07%	-1.49%	65%	46%	-11%
<b>2010-2015</b>	9.07%	6.68%	1.11%	1.29%	74%	12%	14%
FCS industry	Y	K	L	A	K	L	A
<b>1990-2015</b>	10.10%	6.83%	4.27%	-1.00%	68%	42%	-10%
<b>1990-2000</b>	5.06%	5.49%	2.53%	-2.96%	108%	50%	-58%
<b>2000-2010</b>	13.81%	9.96%	6.97%	-3.13%	72%	50%	-23%
<b>2010-2015</b>	9.90%	3.30%	1.09%	5.51%	33%	11%	56%
GS industry	Y	K	L	A	K	L	A
<b>1990-2015</b>	9.31%	3.57%	4.35%	1.40%	38%	47%	15%
<b>1990-2000</b>	6.79%	1.26%	2.70%	2.83%	19%	40%	42%

[Type here]

<b>2000-2010</b>	12.44%	6.94%	7.11%	-1.61%	56%	57%	-13%
<b>2010-2015</b>	10.65%	-1.37%	1.09%	10.93%	-13%	10%	103%

Source: own calculations based on (FCSA, 2016)

First, the annual growth rate indicated that the REBS showed the highest average growth rate of 10.93% followed by TSC, RH, SPS, FCS, and GS, with 10.67%, 10.24%, 10.23%, 10.10%, and 9.31%, respectively. Thus,  $H_5$  was rejected when testing whether the FCS increased due to the labor was the main contributor to the growth rate for the tertiary sector from 1990 to 2015, as it turned out REBS was the main contributor to growth. On the other hand, the WRTRS produced the lowest average annual growth rate of 6.84% between 1990-2015. The GS showed an average growth rate of 10.65%. Ultimately, all economic services industries showed roughly similar annual average growth rates from 1990 to 2015. In addition, such a result is an important record, that, the output average annual growth rate of tertiary industries was observed to be particularly downward after the period 2000-2010, with the exception of the RH industry.



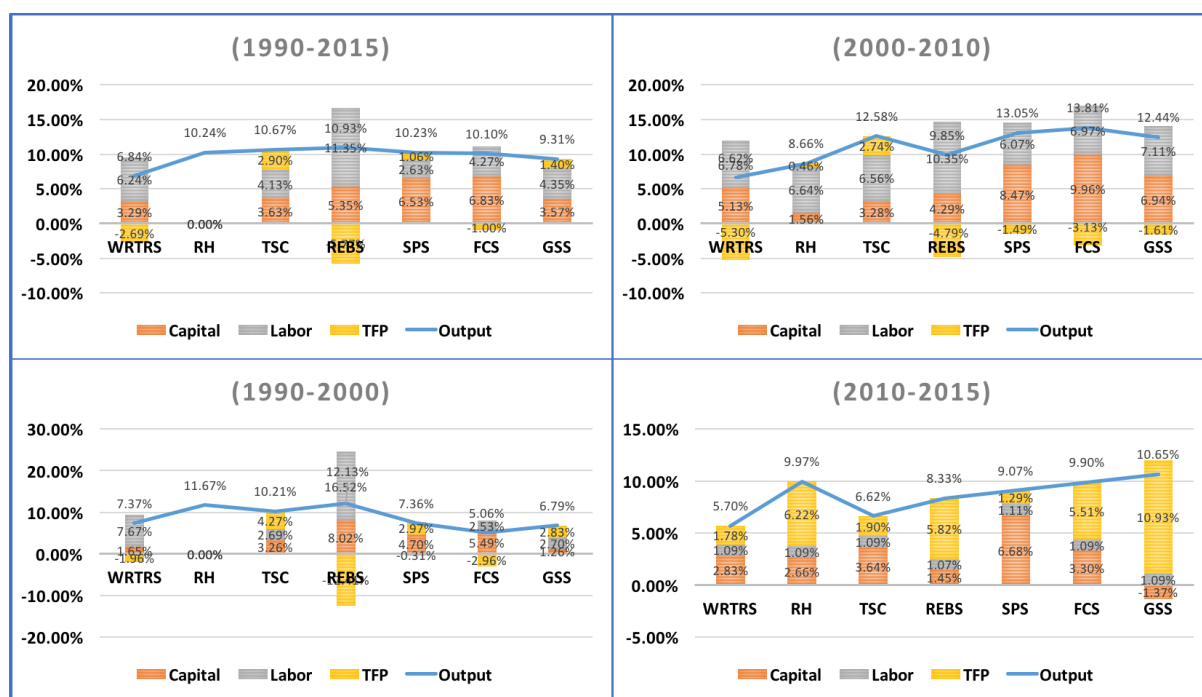
**Figure 28. UAE's average annual growth (%) for tertiary industries**

Source: own calculations based on data from FCSA

It can be observed from the annual growth rate of capital accumulation that between 1990-2015 the FCS and SPS produced the highest average growth rates of 6.83% and 6.53%, respectively. In the period of 1990-2000, the average growth rates fluctuated between 8.02% and 1.26% with the highest in REBS and the lowest in GS. However, between 2000 and 2010 the highest growth rate was 9.96% in the FCS, and the lowest in the RH with 1.56%. Between 2010-2015, however, the average growth rate was the highest in the SPS with 6.68% unlike in the GS with a negative value of about -1.37%.

[Type here]

On other hand, the annual growth rate for labour from 1990-2015 was 11.35% in the REBS and 2.63% in the SPS. The growth rate of the numbers of workers was the highest in the REBS in all periods of time except from 2010 to 2015 when the growth rate declined from 10.35% to 1.07%. Between 1990-2015 the TFP indicated a positive growth rate in the TSC, SPS, and GS with 2.90%, 1.06%, and 1.40%, respectively unlike in the WRTRS, REBS, and FCS with a negative value of about -2.69%, -5.77%, and -1.00%, respectively. The TSC and the TFP indicated positive figures in all periods of times.



**Figure 29. Source of growth (%) for tertiary industries**

Source: own e calculations based on data from FCSA

Secondly, Table 18 and Figure 29 describe the share of growth due to either capital, labour, or TFP. Minimum and maximum figures of the long-term series show that the share due to the capital fluctuated between 34% and 68%, share due to the labour between 26% and 104%, and share due to the TFP between -53% and 27% from 1990 to 2015. Whereas the contribution of capital was the highest in the FCS and the lowest in the TSC, the contribution of labour was the highest in the REBS and the lowest in the SPS, and the contribution of TFP was the highest in the TSC and the lowest in the REBS. Moreover, the SPS showed noticeably high figures due to the contribution of capital to the sector’s output in all periods of time. From 1990 to 2000, the share of growth in the FCS due to the capital was the highest with 108% indicating the development of the financial industry due to the capital. However, between 2010-2015 the GS showed negative contribution due to capital with a growth rate of -13%.

[Type here]

In terms of labour, the REBS and WRTRS contributed the most in most periods of times. TFP and TSC showed a better performance in all periods of time. Specifically, from 2010 to 2015 the TFP showed positive performance of 31%, 62%, 29%, 70%, 14%, 56%, and 103% for WRTRS, RH, TSC, REBS, SPS, FCS, and GS, respectively. On the other hand, the share of contribution due to the labour declined 11%, 16%, 13%, 12%, 11%, and 10% for WRTRS, RH, TSC, REBS, SPS, FCS, and GS, respectively. The decrease in the number of workers had a significant positive impact on the TFP trend. Thus, the service sector needs improved management in terms of the number of workers (efficiency of allocation of resources) because this process will help to improve the TFP moving trend.

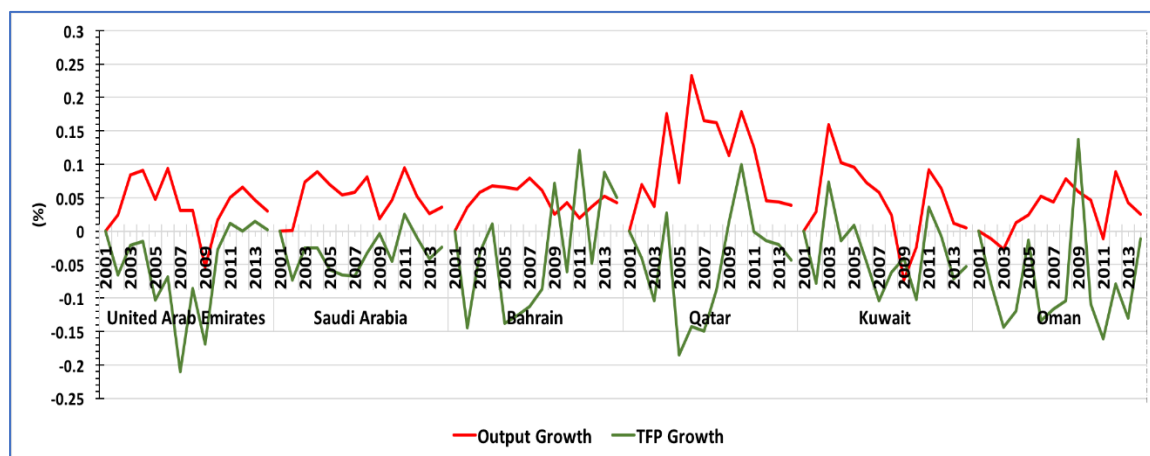
Therefore, it can be concluded from the results that in terms of average annual growth rate from 1990 to 2015 the REBS, TSC, RH, SPS, FCS, and GS indicated the highest growth with 10.93%, 10.67%, 10.24%, 10.23%, 10.10%, and 9.31%, respectively. The GS industry continued to grow especially between 2010-2015 by 10.65% average growth rate, while the rest of the industries declined compared to the previous time periods indicating the importance of the productivity of the governmental service. Moreover, the FCS and SPS showed the highest average growth rate in capital between 1990-2015. The REBS indicated the highest growth in labour on the long-term, however, it declined specifically between 2010-2015. The TSC, SPS, and GS showed positive average annual growth rate results with regards to the TFP on the long-term. On the other hand, the FCS contributed the highest share in capital, the REBS in labour, and the TSC in TFP. In addition, a decline in the contribution share of labour can be observed, the contribution share of TFP was positive in all industries specifically from 2010 to 2015. Thus, the rational management of the increasing share of the number of workers had an impact on the performance of the TFP.

#### **4.4 Growth accounting of country approach**

Figure 30 shows the output and TFP movement tendency for GCC's countries from 2001 to 2014 indicating the similarities between these countries in terms of the movement of those two variables. In general, the TFP movement trend fluctuated mostly in the negative range specifically between 2002 and 2010. On the other hand, the output trends explained by real GDP showed mostly heavy fluctuations but in a positive range with the exception of 2009 due to the world financial crisis. It is worth mentioning here, that Saudi Arabia was still in the positive range even in 2009, although the growth rate declined from 8% in 2008 to only 2% in 2009. In conclusion, these countries need to focus on improvements in technology, creativity and innovations. Moreover, oil prices had a higher impact on the turnout of these nations suggesting the need to diversify their incomes and re-evaluate the diversification strategies because their productivity

[Type here]

indicated poor performance.



**Figure 30. Output and TFP growth for members of GCC region from 2001-2014**

Source: (World 2017)

Table 19 describes the annual average growth rates of variables and a share of growth of input factors (capital, labour and TFP) in time period and from 2001 to 2014. The annual average growth rate was 4.0% in the UAE, 5.8% in SAU, 5.1% in BHN, 12.8% in QTR, 4.4% in KWT, and 3.9% in OMN. QTR had the highest recorded figure for the period from 2001 to 2014. On other hand, the average growth rate for the period from 2010 to 2014 indicated similar figures for these countries. Given the average growth rate of productivity performance for the period of 2001-2014, -6.1% was observed in UAE, -1.9% in SAU, -3.1% in BHN, -2.9% in QTR, -3.0% in KWT, and -6.1% in OMN.  $H_6$  that examined whether the UAE was more productive among GCC countries in terms of average growth rate of TFP was rejected because according to findings SAU was more productive from 2001 to 2014. Regardless, in the period of 2010-2014 a 0.3% growth rate of productivity was observed in the UAE. In terms of development of gross capital formation and labour for the period 2001-2014 all countries observed a higher average increase rates in gross capital formation, except in the UAE where labour dominated the growth rate.

[Type here]

**Table 19. Growth accounting results of the GCC countries**

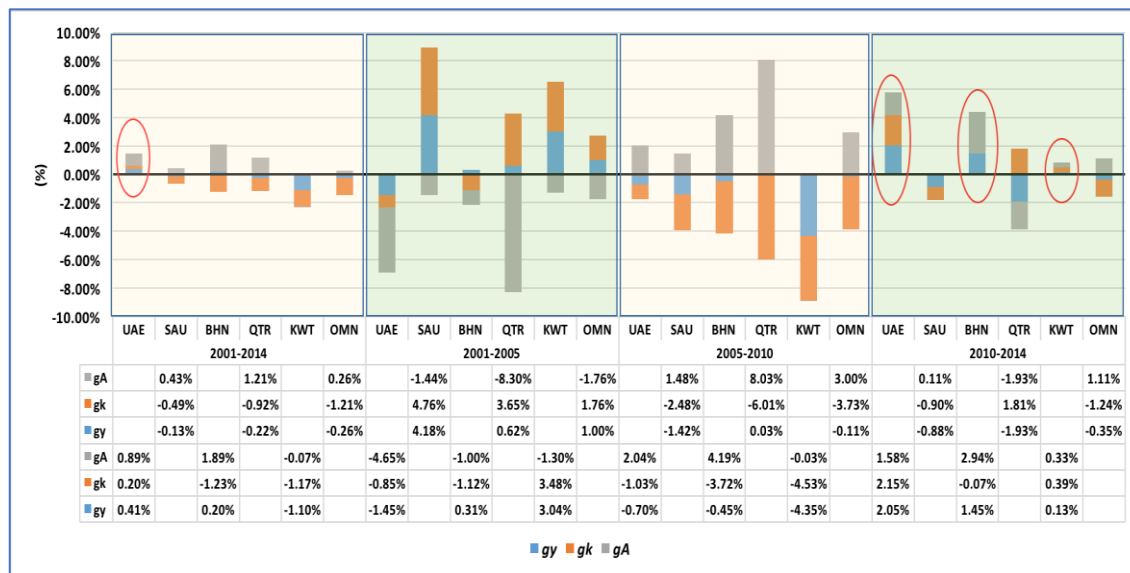
Average annual growth rates					Share of growth due to:		
UAE	Y	K	L	A	K	L	A
2001-2014	4.0%	9.0%	10.6%	-6.1%	67%	184%	-150%
2001-2005	6.7%	6.9%	10.1%	-2.5%	31%	106%	-37%
2005-2010	1.9%	10.8%	13.9%	-11.1%	174%	523%	-598%
2010-2014	5.0%	8.9%	2.8%	0.3%	54%	40%	6%
SAU	Y	K	L	A	K	L	A
2001-2014	5.8%	15.5%	4.3%	-1.9%	81%	52%	-33%
2001-2005	6.3%	16.3%	5.0%	-2.1%	78%	56%	-33%
2005-2010	5.3%	17.7%	3.9%	-2.7%	101%	51%	-52%
2010-2014	5.0%	6.5%	4.9%	-0.4%	39%	69%	-8%
BHN	Y	K	L	A	K	L	A
2001-2014	5.1%	9.3%	7.7%	-3.1%	55%	105%	-60%
2001-2005	5.8%	24.0%	6.3%	-5.8%	124%	77%	-101%
2005-2010	5.5%	8.2%	11.0%	-4.7%	45%	142%	-87%
2010-2014	3.9%	-3.2%	1.1%	4.1%	-24%	20%	104%
QTR	Y	K	L	A	K	L	A
2001-2014	12.8%	20.0%	13.9%	-2.9%	47%	76%	-22%
2001-2005	9.2%	26.5%	9.4%	-5.3%	86%	71%	-58%
2005-2010	16.4%	18.4%	19.3%	-2.6%	34%	82%	-16%
2010-2014	6.0%	11.6%	4.7%	-0.8%	58%	55%	-14%
KWT	Y	K	L	A	K	L	A
2001-2014	4.4%	11.7%	5.6%	-3.0%	79%	88%	-67%
2001-2005	10.4%	24.6%	3.3%	0.7%	71%	22%	7%
2005-2010	1.0%	7.7%	7.7%	-6.0%	236%	481%	-617%
2010-2014	4.2%	7.1%	5.6%	-1.9%	50%	94%	-44%
OMN	Y	K	L	A	K	L	A
2001-2014	3.9%	14.6%	8.0%	-6.1%	113%	143%	-155%
2001-2005	-0.2%	19.7%	4.0%	-8.8%	3786%	-1785%	5671%
2005-2010	5.8%	15.3%	6.8%	-3.5%	79%	82%	-61%
2010-2014	4.2%	9.7%	13.7%	-8.3%	69%	227%	-195%

Source: Own calculations based on World Bank Database

The share of growth due to three input factors was dominated by the contribution of labour with

[Type here]

184%, 105%, 76%, 88%, and 143% in the UAE, BHN, QTR, KWT, and OMN respectively (Table 19). This figure was 52% in SAU where capital contributed 81% to growth from 2001 to 2014. TFP improvement in the UAE can be observed in the period of 2010-2014 by shifting of the growth contribution of labour to capital with 40% and 54%, respectively.



**Figure 31. Labour productivity from (2001-2014)**

Source: Own calculations based on World Bank database

Figure 31 describes labour productivity for GCC member counties with regards to time periods (2001-2014, 2001-2005, 2005-2010, and 2010-2014) and classified productivity components such as growth per capita (gy), capital produced per capita (gk), and TFP per capita (gA). Consequently, the UAE showed a positive trend for the period from 2001 to 2014, while other countries demonstrated negative figures at least in two components of the labour productivity analysis. On the other hand, specifically from 2010-2014, those countries UAE, BHN, and KWT showed positive labour productivity with 2.05%, 1.45%, and 0.13% in TFP per capita, respectively. Moreover, the growth caused by gross capital formation varied between 0.20% and -1.23%, and TFP growth between 1.89% and -0.07 from 2001 to 2014.

[Type here]

## **5 CONCLUSIONS AND RECOMMENDATIONS**

Capital investment is a major driver of economic growth according to many scientific literatures. In the case of many developing countries, there is a need for investment, by raising average per capita income and thus increasing savings and then investment. This process is important to stimulate the development process and increase the welfare of society and individuals. All this comes only through a sustained long-term economic growth process. Human capital is of great importance, so most countries seek to invest in it as the most important and variable factor that can influence and achieve high rates of economic growth. The growth rates of Asian countries that dazzled the world are proof of this.

Investment in human capital is formed in three main forms: training, education, and health. Thus, improved educational and health care systems will lead to higher perspective income both per capita and national terms. In the same context, Investment in people will lead to creations and innovations, which in return will lead to better workforce practice and productivity. In addition, the use of factors of production has a direct impact on production. In the case of study, it was concluded that the increase in any major factor of production could resulted in an adverse effect on another factor. It is important to plan well to manage production elements efficiently. Therefore, the conclusion is summarised according to the thesis structure such as the capability approach, sectoral approach, industry approach, and country approach as described below. The conclusion is based on the results of the analysis conducted in this study.

### **5.1 Capibility approch**

The human development has two dimensions. The first one is concerned with the level of human development in the various stages of life for the development of human capacities, physical energies, mental, psychological, social, technical skills etc. The second one is the process of HD related to the investment of resources and inputs that generate wealth and production for the development of human's capabilities enhancing productivity.

The HD in the UAE made significant achievements in the improvement of living standards, healthcare, and education. The UAE achieved very high human development and GNI per capita was high compared to developed countries but recorded a decline after 2005. This part analyzed the performance of HD into two perspectives national and international. The national level showed that the UAE improved four HDI dimensions (1980-2014), where the average life expectancy at birth increased from 67.6 to 77 years, mean years of schooling, increased from 3.6 to 9.5 years, expected years for schooling raised from 8.6 years to 13.3 years, and GNI per capita

[Type here]

decreased by 42.0% from year 1990 to 2014. The results of international level found that the UAE recorded better figures than the Arab State, Singapore had the highest number among the comparison group in the average life expectancy at birth, Norway has been classified No1 among all countries in the category mean years of schooling and expected years of schooling, UAE tops the comparison group in GNI per capita, and mean years of schooling in 2010 and 2011 was higher in the UAE than Singapore.

As an objective to examine the level of development and positive total productivity it can be concluded that based on the hypothesis test ( $H_1$ ), which questioned whether the country had a higher stage of development, the TFP showed a negative trend. Thus, the hypothesis ( $H_1$ ) was rejected.

## **5.2 Sectoral approach**

The growth accounting approach was used to examine the division of the UAE's economy through three sectors. From 1990 to 2015 the output of the tertiary sector showed the highest annual average growth rate of 8.37%, followed by the secondary sector with 6.88%. The annual average growth rate was dominated by the labour inputs in all three sectors of the economy with 4.71%, 5.95%, and 5.21% in the primary, the secondary and the tertiary sectors, respectively. The annual average growth rate for the capital accumulation produced the highest growth in the tertiary and the secondary sectors with 4.13% and 3.08%, respectively. The annual growth rate for TFP was negative in the tertiary and the secondary sectors, unlike in the primary sector. From 1990 to 2000, output of the primary sector showed the highest annual average growth rate with 14.82%. From 2000 to 2010, the output of the secondary sector achieved the highest annual average growth rate of 10.49%. From 2010-2015, the output of the tertiary sector recorded the highest annual growth rate of 7.99%. Lastly, from 2010-2015 the annual growth rate for TFP was positive in the secondary and the tertiary sectors with 1.61% and 5.22%, respectively.

The second perspective was the contribution share of growth due to production factors (capital, labour and TFP). It can be concluded that from 1990 to 2015 the share of growth due to labour had a significant impact on the growth of each sector with a share of 70%, 86%, and 62% in the primary, the manufacturing and the tertiary sectors, respectively. The share of growth due to the capital was 24%, 45%, and 49% in the primary, manufacturing, and tertiary sectors, respectively, and the 6% share of growth due to TFP was positive only in the primary sector, but it was negative in the secondary and the tertiary sectors with a share of -31% and -12%, respectively. By noting the share of capital and labor that has been observed in the primary sector more than secondary

[Type here]

and tertiary sectors in particular after 2010. The reason may be that investment directed to the costly and unproductive sector or the primary sector is of interest to the country.

Hypotheses ( $H_2$ ), ( $H_3$ ),—were tested in this section of this dissertation. Hypothesis ( $H_2$ ) was accepted because the primary sector was a key stage of economic growth from 1990-2015. Hypothesis ( $H_3$ ) was rejected because the source of growth was labour input with a significant impact on each sector from 1990 to 2015.

### **5.3 Industry approach**

Nowadays, in many studies the tertiary service is considered the key engine moving the country's economy toward a sustained economic development. Furthermore, this sector is no more characterised by low productivity as described in some studies. While, the secondary sector according to some studies considered as the engine to economic growth regardless many studies indicated that the tertiary sector more productive than secondary sector.

The secondary sector included four economic industries and four periods of time were analysed. The diversification strategy developed by the UAE has gained its benefits and showed that the MQ is not the main player such as the MFG and CN. The average annual growth rate for MFG showed the highest contribution to the secondary sector's output. Furthermore, the average annual growth rate of capital, labour and TFP fluctuated between the following maximum and minimum rates: (3.85% - 2.55%), (6.28% - 2.99%), and (-0.31 – (-2.17%).

The contribution growth shares due to labour had a higher impact on the economy compared to capital and TFP, in general in MFG, MQ, and CN. There was a vice versa relationship between the size of labour and TFP performance. If the number of workers decreased, the performance of TFP improved. Thus, the study demonstrates that the MFG industry was the main contributor to the secondary sector's output followed by CN. In addition, the oil industry contributed less to the secondary sector's output. The TFP performance was positive specifically from 2010 to 2015.

This part of the investigation examined the research hypothesis to check whether the oil production industry had a significant impact on the growth of the secondary sector. The hypothesis ( $H_4$ ) test was rejected because the MFG sector had a highest contribution on the growth rate of the secondary sector. Important to mentioned, that secondary industries, the average annual growth rate for labour in MFG industry noticed declined, where recorded 7.8% between 1990-2000, 6.1% between 2000-2010, and 1.1% in 2011-2015. The reason could be replacing human labour with automated technology. In addition, average capital growth rate, the downward trend was observed in all secondary industries specifically after 2010.

[Type here]

The tertiary sector included seven industries that were analysed. Based on the results, all industries in the tertiary sector contributed significantly to the GDP growth. The financial industry symbolised by the FCS showed the highest growth due to capital, REBS indicated the highest employment share, and TFP moved in a negative direction specifically in the following industries: WRTRS, REBS and FCS. However, in TSC, SPS and GS TFP was positive. In addition, the TFP showed positive figures specifically from 2010 to 2015 in all industries due to a decline in the growth share contributed by labour. Therefore, the tertiary sector has had highest contribution on economic growth in terms of value added and employment share.

The results of this analysis show that the contribution of factors of production varied among all industries in the tertiary sector, however, there was a visa versa relationship between the performance of TFP and the share of labour. Based on the testing of the research hypothesis ( $H_5$ ) was rejected because real estate services and business services are the main contributor to the growth rate of the tertiary sector and increased due to the labour. As important recorded, that the output average annual growth rate of tertiary industries was observed to be particularly downward after the period 2000-2010, with the exception of the RH industry.

#### **5.4 Country approach**

After applying a growth accounting exercise as panel-data approach from the year 2001-2014 by break down in 4 periods of times, roughly average 5 years, showed that the economic diversification strategies and abundance of natural resources, undoubtedly contributed to the economic development in the Gulf Cooperation Council (GCC), but in general have not achieved optimal productivity at the aggregate production level, or even at the level of labour productivity. Three inputs, such as capital formation, labour inputs, TFP, and the output constant GDP, were examined. TFP was moving in a negative direction especially between 2002-2010. The annual growth rate (12.8%) was higher in Qatar compared to other member countries. The productivity performance showed a negative trend in all members from 2001 to 2014. Conversely, in the period of 2010-2014 only share of labour dominated, unlike the situation in the SAU, where it was the gross capital formation. Labour productivity per capita in the UAE was positive from 2001 to 2014 with BHN, while in the UAE, BHN and KWT it was positive in the period of 2010-2014. In short, the diversification process had made an improvement in the whole economy's productivity, performance only between 2001-2014 in the UAE. The figures recorded for the UAE for the period 2010 to 2014 were more positive compared to the whole examined period. In addition, BHN and KWT recorded positive results in labour productivity between the period of 2010 to 2014.

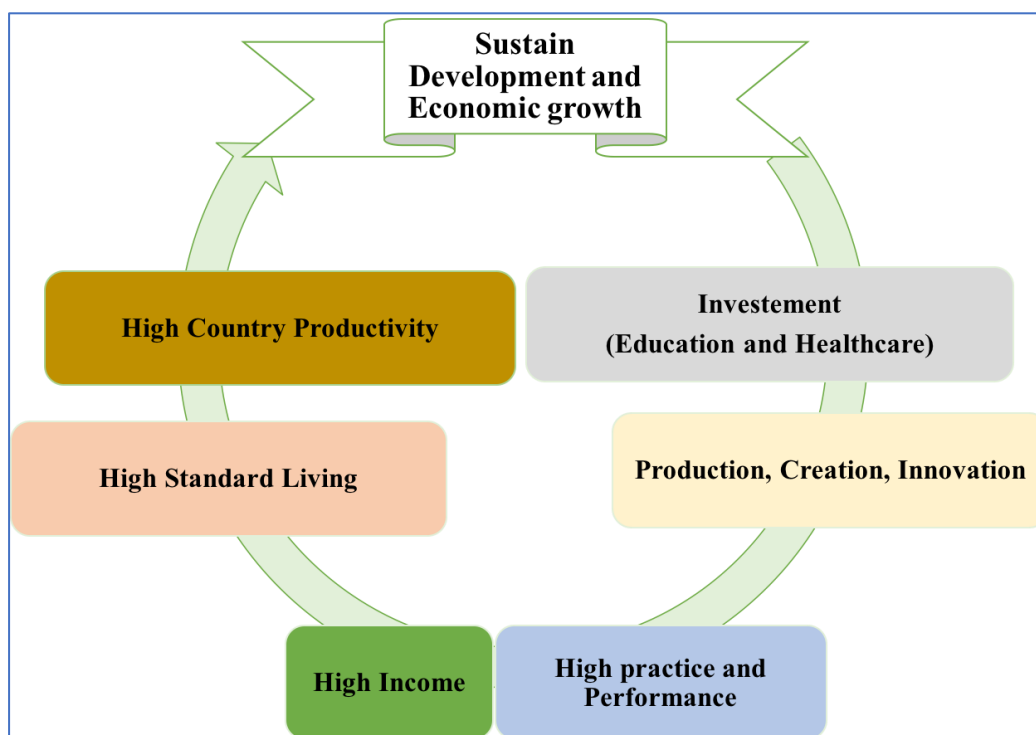
[Type here]

A research hypothesis ( $H_6$ ) was examined in this part of dissertation. Hypothesis ( $H_6$ ) was rejected because the average growth rate of TFP was -6.1%, -1.9%, 3.1%, -2.9%, -3.0%, and -6.1% in the UAE, SAU, BHN, QTR, KWT, and OMN, respectively from 2001 to 2014. Therefore, the SAU's TFP was the best among the GCC countries.

## 5.5 Recommendations

This study is a research effort to answer the factors that were fundamental and have the most contribution on economic growth and economic development in the United Arab Emirates. We believe that the results will undoubtedly contribute to the growth history of the trial period. Therefore, in this section, we put our proposal to the decision-maker based on the results of the study. The study had four approaches, the purpose of which was to produce new results. Therefore, we put our proposal according to these approaches.

To achieve sustainable development and economic growth, the author makes his recommendations by creating Figure 32.



**Figure 32. Structure of the author's recommendation**

Source: own construction based on findings

The two dimensions of human development are educational system and health care. The education system is very important for policy makers in the UAE. The educational system has a significant impact on human resources according to most scientific studies. Therefore, the author of the

[Type here]

improvement of the educational system by studying the model used by Scandinavian countries (Denmark, Norway, Sweden and Finland). According to the World Bank, these countries have allocated a good proportion of their gross domestic product income to the education system. These countries also rank higher ahead of the Asian countries such as Japan, Singapore and South Korea. With regards to health care, the model used in New Zealand and Singapore can be recommended. According to the index of prosperity, these nations rank first. Thus, the health care system is very important to be considered more and more.

TFP is considered a major element to achieve a sustained economic growth in the long term. TFP includes not only the technology but essential organisation practices, skills, training, knowledge, innovations, and creations as well. Therefore, to achieve sustainable long term economic growth, the saving rate has to be improved leading to high investment in the infrastructure and improvement of the TFP trend. The major factor that leads to achieve this main objective is human resource. Thus, the author recommends to benchmark to highest ranked countries in the Global Innovation Index (GII) in 2017 where the most innovative countries were Switzerland, Sweden, Netherlands, USA, and UK. Another recommendation is to take advantage of India because it is an emerging innovative center in Asia. Therefore, a good education and health care will lead to better workforce practices, creations, and innovations.

In terms of good allocation and management of human resources some recommendations for policy makers are presented here. The number of workers, specifically unskilled workers, will not help to increase productivity. Thus, the investigation of the good management of this essential resource is recommended. According to the World Bank, the majority of labour in the UAE is guest labour, therefore the impact of citizen labour may be limited specifically in the public sector. Thus, the author recommends that the country takes advantage of foreign students to be educated in the educational system invested in the country through a set of rules that give these students some support and working opportunities inside the country because they benefitted from the educational and healthcare investment. This portion can be used in the business activities without importing unskilled people or guest labour educated in poor education systems. The author believes that the stage of schooling is more very important from university or college or institutional education. Therefore, the question is why we let those students that were educated in the country's culture leave the country after finishing education due to the absence of sponsorships. Thus, policymakers should keep and take advantage of those students by issuing new policies that help to achieve the objective.

In conclusion, human resource is the main factor that leads to sustainable economic development and economic growth. Improved educational and health care systems will lead to higher

[Type here]

perspective income both per capita and national terms. Investment in people will lead to creations and innovations, which in return will lead to better workforce practice and productivity. The good management of the production factors such as labour will increase the productivity by taking advantage of foreign students benefitting from education and the health care systems to allocate them in the business activities that need more skilled people.

The theoretical basis of the link between human development, economic growth and sectoral economic development or economic industries in terms of contribution and productivity remains in the development phase, and so this study can provide some insight into these topics. Thus, future research – both theoretically and experimentally - is important.

What distinguishes the UAE from the rest of the world, especially among countries rich in natural resources, is its ambitious leadership, which leaves no effort or effort to build a modern and distinctive state that aspires to leadership, excellence and a path to well-being, investing in its human resources and harnessing its wealth for the benefit of man. The announcement of the thinking and planning of the UAE for next half century, so that the UAE economy is sustainable, connected and diversified, not dependent on traditional resources, including oil. On the other hand, thinking and planing in forward step to beyond the oil age. It is evidence of awareness, awareness of reality, and preparation for the future by the country's leadership.

Therefore, we suggest that effective management of resources and properly used for the future, investment in human capital, and transformation into a knowledge economy, will be a successful country's step. Because, investing in human capital, knowledge has direct positive connection to people's capabilities in account for success and achieve goals.

The other proposed for economic sectors and employment. There must be a deliberate and scientific plan to take advantage of skilled and educated workers by moving them to the productive and effective sectors of the economy. While minimizing unskilled labor. According to this study, there are industries that have an impact on the national GDP, which can be used to employ them, especially those who benefited from the health and education services in the country. Importantly, the secondary industries, specifically the manufacturing industry and electronic industry, has an important role to play in moving the country into the world of knowledge.

[Type here]

## **6 MAIN CONCLUSIONS AND NOVEL FINDINGS OF THE RESEARCH**

The UAE achieved successful social and economic growth during the examined period. The country has gained the confidence and interest of the global community in terms of economic growth and development programs, by giving importance to the development of infrastructure, human capital and diversification plan that reduce dependence on oil income and the development of economic sectors. Therefore, the main conclusion and novelty addressed according to the results summarised in the following:

Capability approach: The Human Development Index (HDI) is a United Nations index that measures the welfare of people in the world. The UN allocates an annual report issued since 1990 to measure the level of development of countries and improve the life conditions of people in different countries. The HDI in any country reflects the level of economic, social, livelihood and security stability, an important factor in strengthening the national investment structure and stimulating foreign investment. The index analyze four dimensions related to standard of living, education, and health.

Thus, two levels of analysis are used by the author such as the national level representing a broader picture related to the reality of HD in the country, and the international level in order to compare the UAE to other countries, groups and regions according to HDI report to see where the country stands. Since the establishment of this development the UAE has always been in an advance position in very high HD category. It made a significant progress at all levels of HD components. The average annual growth of HDI increased by 59%, the average life expectancy at birth rose from 68 to 77 years, the mean years of schooling increased from 3.6 to 9.5 years, the expected years of schooling rose from 8.6 to 13.3 years, and the GNI decreased by 42% from 1990 to 2014. The hypothesis was rejected because the high level of development did not correspond with a high level of productivity.

Sectoral approach: growth calculations were used to analyse the source of growth to see the impact on economic growth through three factors of production, i.e. capital, labour and TFP to the primary, secondary and tertiary sectors. The source of growth in the major sectors was labour-intensiveness. The primary sector was the essential stage of successful economic growth from 1990-2000. The tertiary sector made a significant impact on the growth of the the UAE's economy followed by the secondary sector. The TFP trend was positive between 2010-2015, indicating a decline in the number of workers so the path of the TFP improved. Two research hypotheses were tested. The primary was the key stage of economic growth, therefore the hypothesis was accepted.

[Type here]

Capital was not the main source of growth of secondary and tertiary sectors, therefore the hypothesis was rejected.

Industry approach: the level of growth in the secondary and tertiary sectors was analysed. A growth accounting method was applied to investigate the source of growth and key industries of the economic sector. First, the secondary sector included four economic industries. The empirical results indicated that the economic system of the UAE is diversified because the oil production industry was not the main contributor to the sector's growth, so the hypothesis was rejected. Nevertheless, the manufacturing industry was the primary contributor to the growth of the secondary sector. Second, the tertiary sector included seven economic industries. The real estate services sector was the biggest contributor to growth in the tertiary sector, rejecting the research hypothesis as it was testing the financial services industry as the key driver of the sector's growth. Labour input was the main source of growth in wholesale and retail trade, and repairing services industry. The TFP trend was positive from 2010 to 2015 indicating that it is important to manage the number of workers in the UAE efficiently.

Country approach: A calculation of growth was carried out in the neighbouring countries of the UAE called the GCC. The productivity performance of all members was negative from 2001 to 2014, unlike the UAE where it was positive from 2010 to 2014. GCC countries were classified as labour-intensive unlike SAU with a capital-intensive production. The labour productivity per capita was positive in the neighbouring countries. One research hypothesis was tested. The research hypothesis claiming that the UAE is more productive in terms of annual average growth rate was rejected.

Through the study conducted there were many new findings resulted due to different approaches taken in this study. In addition to that, the scope of the study and analyzing the UAE's economic major sectors was a new effort and beside this also the development level has not been analysed with the economic growth by any study, at least with regards to the UAE. The most Important new findings to be mentioned and concluded as follow:

- The share of growth due to capital and labour declined in the tertiary sector and the secondary sector unlike in the primary sector, where it increased. The reason behind this is directed investment in a costly and unproductive sector or it is a new trend of the country to give more attention to the primary sector.
- Secondary industries, the average annual growth rate for labour in MFG industry noticed declined, where recorded 7.8% between 1990-2000, 6.1% between 2000-2010, and 1.1% in 2011-2015. The reason could be replacing human labour with automated technology.

[Type here]

- Average capital growth rate, the downward trend was observed in all secondary industries specifically after 2010.
- The output average annual growth rate of tertiary industries was observed to be particularly downward after the period 2000-2010, with the exception of the RH industry.

This study tested the contribution rate of economic sectors and industries in the UAE from 1990 to 2015. Also, he examined the labour productivity in the GCC states. The study found that in the UAE the TFP productivity performance was poor, with the exception of the period from 2010 to 2015 due to the efficiently managed labour input. Therefore, the economic system of the UAE was analysed in depth recording the novelties presented here. Second, the development level has not been analysed with the economic growth by any study, at least with regards to the UAE.

[Type here]

## **SUMMARY**

This dissertation includes six major chapters. Chapter I demonstrates the aims and objectives, research methodology, research hypotheses, thesis structure, and ethical considerations.

Chapter II demonstrates the technical literature on the subject matter of the dissertation, examining the analytical method with regards to the United Arab Emirates (UAE), GDP structure, labour force structure, labour market, the Gulf nations, Gulf's GDP structure, Gulf's population, and Gulf's gross capital formation. In short, the description of the economy of the country and also the Gulf countries. The labour market of the UAE is described in order to explore the components that shift the demand and supply of the market. It also includes reviews of the technical literature related to the objective of the study such as economic development, economic growth, human development, the role of the economic sectors, and the function of production and productivity. These consolidated data have reinforced the importance of productivity and the role of the economic sectors in enriching economic growth. The conclusion is that development is the main objective of achieving sustainable economic growth and human development in order to improve productivity.

Chapter III includes the general research approach and methodology. This chapter examines research variables, research data sources, research hypotheses, and theoretical framework. This part illustrates and describes the methodology used, and classifies the structure of the dissertation. Four approaches are described in terms of methodology, such as capability approach, sectoral approach, industry approach, and country approach. This part illustrates the way the data and approaches were sourced for the analysis. In addition, the growth accounting model is described by calculating the results specifically for sectoral, industry, and country approaches. Mathematical equations are explained in this part and the secondary data methods are explained.

Chapter IV includes the general findings for the dissertation structure approaches. First, human development is analysed to see the level of development in the country supported by figures and tables with the conclusion that the UAE reached a very high level of development. Second, the sectoral approach is presented with figures and a table to give more explanation with regards to the results obtained for the major economic sectors in the UAE. In short, the primary sector was found to be the key for successful economic growth. The tertiary sector was the main sector contributing to growth from 1990 to 2015. The economy of the UAE was labour intensive, which was the main source of growth. The secondary sector is followed by the tertiary sector in the contribution to economic growth. Third, the industry approach is presented in depth for two economic sectors, namely the secondary and tertiary sectors. In the secondary sector four

[Type here]

economic industries are examined with the conclusion that the key to growth is not oil production but the manufacturing sector. Lastly, the country approach is presented, which examines the productivity between the gulf nations. The results found that the UAE was not the most productive among them but labour productivity was the highest among the examined nations.

Chapter V generally addresses the conclusions and recommendations obtained from the results. Chapter VII elaborates on the main conclusions and the novelty of this thesis. In short, the overall productivity of the factors improves when the number of workers declines, in particular from 2010 to 2015. The tertiary sector is the main contributor to growth followed by the secondary sector. Real estate and trade business services are the main industries contributing to the growth of sectors. The UAE economy can be considered more diversified.

[Type here]

## REFERENCES

1. Abramovitz, M., 1956. Resource and output trends in the United States since 1870. In: Resource and output trends in the United States since 1870. NBER, pp. 1-2
2. Acemoglu, D., 2008. Introduction to modern economic growth. Princeton University Press.
3. Alam, A., 2008. Unleashing prosperity: productivity growth in Eastern Europe and the Former Soviet Union. Washinton DC: World Bank Publications.
4. Alkire, S., 2002. Dimensions of human development. *World development*, 30(2), pp. 181-205.
5. Alkire, S., 2005. Why the capability approach?. *Journal of human development*, 6(1), pp. 115-135.
6. Alkire, S., 2010. Human development: Definitions, critiques, and related concepts.
7. Almutairi, H., 2016. Economic Diversification in GCC Economies: A Heaven for Investors.. *International Journal of Economics and Finance*, 8(4), pp. 1-84.
8. Amirapu, A. & Subramanian, A., 2015. Manufacturing or services? An Indian illustration of a development dilemma. pp. 1-53.
9. Anand, S., 1994. Human Development Index: methodology and measurement.
10. Anand, S. & Ravallion, M., 1993. Human development in poor countries: on the role of private incomes and public service. *The Journal of Economic Perspectives*, 7(1), pp. 133-150.
11. Anand, S. & Sen, A., 2000. The income component of the human development index. *Journal of human development*, 1(1), pp. 83-106.
12. Andolfatto, D., 2008. Macroeconomic theory and policy. In: 2 ed. Simon Fraser University, pp. 1-247.
13. APO, 2014. *APO Productivity Databook 2014* , Asian Productivity Organization.
14. Azman-Saini, W., Baharumshah, A. Z. & Law, S. H., 2010. Foreign direct investment, economic freedom and economic growth: International evidence. *Economic Modelling*, 27(5), pp. 1079-1089.
15. Arshad, M.N. and Ab Malik, Z., 2015. Quality of human capital and labor productivity: A Case Of Malaysia. *International Journal of Economics, Management and Accounting*, 23(1), p.37.
16. Bacon, R. & Eltis, W., 1978. Britain's economic problem: too few producers. Springer.
17. Bah, E.-h. M., 2008. Structural transformation in developed and developing countries. pp. 1-32.
18. Baldwin, R. E. & Meier, G. M., 1957. Economic Development: Theory. History, Policy. pp. 1-336.
19. Barro, R. J., 1991. Economic growth in a cross section of countries. *The quarterly journal of economics*, 106(2), pp. 407-443.
20. Barro, R. J. & Sala-i-Martin, X., 2003. *Economic growth*. 2nd ed. MIT Press.
21. Barro, R. J., Sala-i-Martin, X., Blanchar, O. & Hall, R., 1991. *Convergence across states and regions*. Economic Growth Center, Yale University.
22. Barr, R. J., 1996. Determinants of economic growth: A cross-country empirical study. *National Bureau of Economic Research*, Issue NBER Working Paper 5698, pp. 1-118.

[Type here]

23. Bassanini, A. & Scarpetta, S., 2002. The Driving Forces of Economic Growth: Panel Data Evidence for the OECD Countries. *OECD Economic studies*, Volume 2001, pp. 9-56.
24. Behrman, J. R. & Wolfe, B. L., 1987. Investments in schooling in two generations in pre-revolutionary Nicaragua: the roles of family background and school supply. *Journal of Development Economics*, 27(1), pp. 395-419.
25. Ben-Porath, Y., 1973. Labour-force participation rates and the supply of labour. *Journal of Political Economy*, 81(3), pp. 697-704.
26. BHN, D., 2017. *Economic Vision 2030 for Bahrain*. [Online] Available at: <http://www.bahrainedb.com> [Accessed January 2017].
27. Blackaby, F. T., 1979. *De-industrialisation*. Heinemann Educational Publishers.
28. Bloom, D.E., Canning, D. and Sevilla, J., 2004. The effect of health on economic growth: a production function approach. *World development*, 32(1), pp.1-13.
29. Bosworth, B. & Collins, S. M., 2003. The empirics of growth: An update. *Brookings papers on economic activity*, 2003(2), pp. 113-206.
30. Bosworth, B. & Collins, S. M., 2008. Accounting for growth: comparing China and India. *The Journal of economic perspectives*, 22(1), pp. 45-66.
31. BP, 2015. *BP Statistical Review of World Energy June 2015*. The US Securities and Exchange Commission.
32. Bradlow, D., 1996. The World Bank, the IMF, and human rights.. *Journal of Transnational Law and Contemporary Problems*, Volume 6, pp. 47-90.
33. Buera, F. J. & Kaboski, J., 2012. The rise of the service economy. *The American Economic Review*, 102(6), pp. 2540-2569.
34. Burda, M. & Wyplosz, C., 2012. *Macroeconomics: a European text*. Oxford university press.
35. Burke, P. J., 2011. *The Changing Wealth of Nations: Measuring Sustainable Development in the New Millennium*. ROUTLEDGE JOURNALS.
36. Cabinet, U., 2017. *Competitive Knowledge Economy*. [Online] Available at: <https://www.vision2021.ae/> [Accessed January 2017].
37. Callen, T., 2008. What Is Gross Domestic Product?. *Finance & Development*, December.pp. 48-49.
38. Castaldi, C., 2009. The relative weight of manufacturing and services in Europe: An innovation perspective. *Technological Forecasting and Social Change*, 76(6), pp. 709-722.
39. Chakarvarty, S. & Mitra, A., 2008. Is Industry still the engine of growth. *An econometric study*.
40. Ciburiene, J. K., 2015. *Agriculture in the context of economic transformations: Lithuanian case*. Economic Science for Rural Development, pp. 89-96.
41. Clark, C. & Others, 1967. The conditions of economic progress.. *The conditions of economic progress*.
42. Cornwall, J., 1977. *Modern capitalism: its growth and transformation*. Martin Robertson.
43. Costanza, R., Hart, M., Talberth, J. & Posner, S., 2009. Beyond GDP: The need for new measures of progress.

[Type here]

44. Costanza, R., Kubiszewski, I. & Giovannini, E., 2014. Development: Time to leave GDP behind. *Nature*, 505(7483), pp. 283-285.
45. Crafts, N., 2009. Solow and growth accounting: A perspective from quantitative economic history. *History of Political Economy*, 41(Suppl 1), pp. 200-220.
46. Dang, G. & Pheng, L. S., 2015. Theories of economic development. In: *Infrastructure Investments in Developing Economies*. Springer, pp. 11-26.
47. Dasgupta, S., Singh, A. & others, 2006. Manufacturing, services and premature de-industrialisation in developing countries: a Kaldorian empirical analysis. ESRC Centre for Business Research, University of Cambridge.
48. De Bel-Air, F., 2015. Demography, Migration, and the Labour Market in the UAE.
49. Denison, E., 1985. Trends in American Economic Growth.
50. Denison, E., 2011. *Trends in American economic growth*. Brookings Institution Press.
51. Denison, E. F., 1962. Sources of economic growth in the United States and the alternatives before us.
52. Desai, M., 1991. Human development: concepts and measurement. *European Economic Review*, 35(2), pp. 350-357.
53. Di Meglio, G., Gallego, J., Maroto, A. & Savona, M., 2015. Services in Developing Economies: A new chance for catching-up? (Working paper 2015-32). pp. 1-36.
54. Duarte, M. & Restuccia, D., 2010. The role of the structural transformation in aggregate productivity. *The Quarterly Journal of Economics*, 125(1), pp. 129-173.
55. Duflo, E., 2004. The medium run effects of educational expansion: Evidence from a large school construction program in Indonesia. *Journal of Development Economics*, 74(1), pp. 163-197.
56. Easterlin, R. A., 1968. Population, labour force, and long swings in economic growth: The American experience. *NBER Books*.
57. El-hadj, M. B., 2013. Sectoral Productivity in Developing Countries.
58. Elhiraika, A. B. & Hamed, A. H., 2006. Explaining growth in an oil-dependent economy: the case of the United Arab Emirates. *Contributions to Economic Analysis*, Volume 278, pp. 359-383.
59. Eucken, W., 2012. The foundations of economics: History and theory in the analysis of economic reality.
60. Fagerberg, J. & Verspagen, B., 1999. Modern Capitalism'in the 1970s and 1980s. In: *Growth, employment and inflation*. Springer, pp. 113-126.
61. FCSA, 2015. *The Federal Competitiveness and Statistics Authority*. [Online] Available at: <http://www.fcsa.gov.ae/> [Accessed 2016].
62. FCSA, 2016. *The Federal Competitiveness and Statistics Authority*. [Online] Available at: <http://www.fcsa.gov.ae/> [Accessed 15 December 2016].
63. Feinstein, C. H., 1978. Capital formation in great britain. *The Cambridge economic history of Europe*, 7(1), pp. 90-92.
64. Fischer, S., 1993. The Role of Macroeconomic Factors in Growth. *Journal of monetary economics*, 32(3), pp. 485-512.

[Type here]

65. Fleurbaey, M. & Blanchet, D., 2013. *Beyond GDP: Measuring welfare and assessing sustainability*. Oxford University Press.
66. Forbes, M., Barker, A. and Turner, S.A., 2010. The effects of education and health on wages and productivity.
67. Forzano & Gravette, 2012. Research methods for the behavioral sciences.
68. Garfield, E., 1987. Theory of technology's role in economic growth brings MIT's Robert M. Solow *tfre*, pp. 3-8.
69. GCC-STAT, S., 2017. *GCC Statistical Center (GCC-Stat)*.. [Online] Available at: <https://gccstat.org/en/> [Accessed January 2017].
70. Gemmell, N., 1982. Economic Development and Structure Change: The Role of Service Sector. *The Journal of Development Studies*, 19(1), pp. 37-66.
71. Ghani, E. & Kharas, H., 2010. The service revolution in South Asia. *SERVICE REVOLUTION*, p. 1.
72. Greiner, A., 2010. Models of economic growth. *Mathematical Models in Economics-Volume II*, pp. 1-46.
73. Grimm, M., Harttgen, K., Klasen, S. & Misselhorn, M., 2008. A human development index by income groups. *World Development*, 36(12), pp. 2527-2546.
74. Grossman, G. M. & Helpman, E., 1993. *Endogenous innovation in the theory of growth (No. w4527)*. National Bureau of Economic Research.
75. Haouas, I. & Heshmati, A., 2013. Can the UAE avoid the oil curse by economic diversification?. pp. 1-23.
76. Haraguchi, N., Cheng, C. F. C. & Smeets, E., 2017. The importance of manufacturing in economic development: Has this changed?. *World Development*, Volume 93, pp. 293-315.
77. Harbison, F. H., 1973. *Human resources as the wealth of nations (Vol.3)*. New York: Oxford University Press.
78. Hayami, Y. & Ogasawara, J., 1999. Changes in the sources of modern economic growth: Japan compared with the United States. *Journal of the Japanese and International Economies*, 13(1), pp. 1-21.
79. Helpman, E., 2009. The mystery of economic growth. *Harvard University Press*.
80. Herrendorf, B., Rogerson, R. & Valentinyi, A., 2014. Growth and structural transformation. Volume 2, p. 855–941.
81. Hou, J., Walsh, P. P. & Zhang, J., 2015. The dynamics of human development index. *The Social Science Journal*, 52(3), pp. 331--347.
82. Hulten, C. R., 2010. Growth accounting. *Handbook of the Economics of Innovation*, Volume 2, pp. 987--1031.
83. IMF, 2014. Labour Market Reforms to Boost Employment and Productivity in the GCC—An Update. The International Monetary Fund (IMF).
84. IMF, 2015. *United Arab Emirates*, Washington, D.C.: International Monetary Fund (IMF).
85. IMF, 2016. *World Economic Outlook April 2016*, Washington, DC: International Monetary Fund (IMF).

[Type here]

86. Istaitieh, A., Hugo, S. & Husain, N., 2007. UAE macroeconomic report. Macroeconomic Report Series, Dubai Chamber of Commerce and Industries, Data Management and Business Research Department, pp. 1-52.
87. Jacobs, G. & Slaus, I., 2010. Indicators of economics progress: the power of measurement and human welfare. *Cadum*, 1(1), pp. 1-65.
88. Jajri, I. and Ismail, R., 2010. Impact of labour quality on labour productivity and economic growth. *African Journal of Business Management*, 4(4), p.486.
89. Jones, C. I., 2015. *The facts of economic growth*. National Bureau of Economic Research.
90. Jorgenson, D. & Timmer, M., 2011. Structural change in advanced nations: a new set of stylised facts.. *The Scandinavian Journal of Economics*, 113(1), pp.1-29., 113(1), pp. 1-29.
91. Jorgenson, D. W., 1988. Productivity and postwar US economic growth. *The Journal of Economic Perspectives*, 2(4).
92. Jorgenson, D. W. & Griliches, Z., 1967. The explanation of productivity change. *The review of economic studies*, 34(3), pp. 249-283.
93. Jorgenson, D. W. & Nomura, K., 2007. The industry origins of the US--Japan productivity gap. 19(3), pp. 315-341.
94. Kaldor, N., 1966. Causes of the slow rate of economic growth of the United Kingdom. An inaugural lecture. s.l.:Cambridge University Press.
95. Kaldor, N., 1967. Strategic factors in economic development.
96. Kenessey, Z., 1987. The Primary, Secondary, Tertiary and Quaternary Sectors of the Economy. *Review of Income and Wealth*, 33(4), pp. 359-385.
97. Kim, J.-I. & Lau, L. J., 1994. The sources of economic growth in the East Asian newly industrialized countries. *Journal of the Japanese and International Economies*, 8(3), pp. 235-271.
98. Kindleberger, C. P., 1965. *Economic Development*. s.l.:McGraw-Hill Inc.,US.
99. Klugman, J., Rodríguez, F. & Choi, H.-J., 2011. The HDI 2010: new controversies, old critiques. *Journal of Economic Inequality*, 9(2), pp. 249-288.
100. Kovacevic, M., 2010. Measurement of inequality in Human Development--A review. *Measurement*, pp. 1-35.
101. Kuznets, S., 1973. Modern economic growth: findings and reflections. *The American economic review*, 63(3), pp. 247--258.
102. KW, D., 2017. *General Secretary for Supreme*. [Online] Available at: <http://www.da.gov.kw/> [Accessed January 2017].
103. Lörcher, S. & Emi, K., 1980. Essays on the Service Industry and Social Security in Japan.
104. Lakhera, M. L., 2016. Economic Growth in Developing Countries: Structural Transformation, Manufacturing and Transport Infrastructure. Springer.
105. Lucas, R. E., 2000. Some Macroeconomics for the 21st Century. *Journal of Economic Perspectives*, Winter, 14(1), pp. 159-168.
106. Malthus, T. R. & Pullen, J., 1989. *Principles of political economy*. Cambridge University Press
107. Mankiw, G. N., 2009. *Macroeconomics*. 7 ed. s.l.:Worth Publishers.

[Type here]

108. Mankiw, N. G., Romer, D. & Weil, D. N., 1992. A contribution to the empirics of economic growth (No.w3541). *National Bureau of Economic Research*.
109. Maroto-Sanchez, A. a. C.-R. J. R., 2009. Is growth of services an obstacle to productivity growth? A comparative analysis. *Structural Change and Economic Dynamics*, 20(4), pp. 254-265.
110. Marti, C., 1996. Is There an East Asian Miracle?. Union Bank of Switzerland Economic Research Working Paper, October.
111. Mascelluti, E., 2015. The extraordinary growth of the four Asian tigers. pp. 1-46.
112. Matsuyama, K., 1992. Agricultural Productivity, Comparative Advantage, and Economic Growth. *Journal of economic theory*, 58(2), pp. 317-334.
113. McCausland, W. D. & Theodossiou, I., 2012. Is manufacturing still the engine of growth?. *Journal of Post Keynesian Economics*, 35(1), pp. 79-92.
114. McGraw-Hill, 2013. *Business Research Methods*, 11th Edition. NY: McGraw Hill.
115. Meier, G. M., 1970. *Leading Issues in Economic Development*. Studies in International Poverty. *Studies in international poverty*., Issue 2nd edition.
116. Mickiewicz, T. & Zalewska, A., 2006. De-industrialisation: Rowthorn and Wells' Model revisited. *Acta Oeconomica*, 56(2), pp. 143-166.
117. Miles, D. & Scott, A., 2008. *Macroeconomics: understanding the wealth of nations*. s.l.:John Wiley & Sons.
118. Miles, D., Scott, A. & Breedon, F., 2012. *Macroeconomics: understanding the global economy*. John Wiley & Sons.
119. Moe, 2015. *The Annual Economic Report 2015*, s.l.: Ministry of Economy.
120. Moh, 2016. *United Arab Emirates, Ministry of Health and Prevention*. [Online] Available at: <http://www.moh.gov.ae/> [Accessed 1 December 2016].
121. Molnár, V. & Máté, D., 2016. PRODUCTIVITY PERFORMANCE OF ESTONIA IN A GROWTH ACCOUNTING APPROACH.. *Annals of the University of Oradea, Economic Science Series*, 25(2), pp. 214-220.
122. Moro, A., 2015. Structural change, growth, and volatility. *American Economic Journal: Macroeconomics*, 7(3), pp. 259-294.
123. Morris, A. C., 1952. Dividing the Economy into Sectors. In: *A Study of Moneyflows in the United States*. s.l.:NBER, pp. 47-68.
124. Mukherjee, S. & Feller, C., 1978. *Restructuring of industrial economies and trade with developing countries*. s.l.:Concept Publishing Company.
125. Mundial, B., 1993. *World development report 1993; investing in health*. s.l.:Oxford University Press.
126. Mushkin, S., 1962. Health as an Investment. *Journal of Political Economy*, Volume 70, pp. 129-157.
127. Mustafa, G., 2013. *Essays on economic growth and human development in Asia*. pp. 1-209.
128. Nafziger, E., 2006. *Economic Development*. 4 ed. s.l.:Cambridge University Press.
129. Nafziger, E. W., 1984. *The Economics of Developing Countries*.
130. Nafziger, W. E., 2006. The Meaning of Economic Development. *UNU-WIDER anniversary conference*, February.pp. 1-17.

[Type here]

131. Nations, U., 2008. International Standard Industrial Classification of All Economic Activities (ISIC), Rev. 4. *United Nations Statistical Papers*, Volume 4.
132. Ngai, R., 1999. Barriers and the Transition to Modern Growth.
133. Nurkse, R., 1991. Problems of capital formation in underdeveloped countries. *Journal of Economic Theory*, pp. 317-334.
134. OECD, M., 2001. Measuring Productivity: Measurement of Aggregate and Industry-level Productivity Growth: OECD Manual. s.l.:Organisation for Economic Co-operation and Development.
135. OECD, P., 2015. OECD Compendium of Productivity Indicators 2015.. s.l.:OECD Publishing.
136. Oláh, J. & Pakurár, M., 2013. Statistical Overview of Unemployment Status at EU Level. *Euroregional Journal of Socio-Economic Analysis*, pp. 5-12.
137. Olivier, B. & David, J. R., 2013. *Macroeconomics*. 6 ed. s.l.:Pearson Education, Inc, Prentice Hall.
138. O'Mahony, M. & Timmer, M. P., 2009. Output, input and productivity measures at the industry level: the EU KLEMS database. *The Economic Journal*, 119(538), pp. F374--F403.
139. Omair, K., 2010. Typology of career development for Arab women managers in the United Arab Emirates. *Career Development International*, 15(2), pp. 121-143.
140. OpenStax, 2014. Principles of Microeconomics.
141. Ozturk, I., 2001. The role of education in economic development: a theoretical perspective.
142. Palley, T. I., 1996. Growth theory in a Keynesian mode: some Keynesian foundations for new endogenous growth theory. *Journal of Post Keynesian Economics*, 19(1), pp. 113--135.
143. Palma, G., 2005. Four Sources of 'De-industrialization' and a New Concept of Dutch Disease. In: *Beyond reforms: structural dynamics and macroeconomic vulnerability*. Palo Alto(CA): Stanford University Press and the World Banks.
144. Permanyer, I., 2011. Assessing the robustness of composite indices rankings. *Review of Income and Wealth*, 57(2), pp. 306-326.
145. Peterson, W. C., 1984. Income, employment, and economic growth. s.l.:WW Norton.
146. Peterson, W. C., 2011. *Income, employment, and economic growth*. New York, WW Norton.
147. Petroleum, B., 2012. *BP statistical review of world energy*. s.l.:London: British Petroleum.
148. Piketty, T., 2014. *Capital in the Twenty-First Century*. s.l.:Belknap Press.
149. Prados de la Escosura, L., 2015. World human development: 1870-2007. *Review of Income and Wealth*, 61(2), pp. 220-247.
150. Psacharopoulos, G., 1994. Returns to investment in education: A global update. *World Development*, 22(9), pp. 1325-1343.
151. QNA, V., 2017. *Qatar National Vision 2030*. [Online] Available at: <http://www.mdps.gov.qa/> [Accessed January 2017].
152. Ramady, M., 2013. Gulf unemployment and government policies: Prospects for the Saudi labour quota or Nitaqat system. *International Journal of Economics and Business Research*, 5(4), pp. 476-498.

[Type here]

153. Ramirez, A., Ranis, G. & Stewart, F., 1997. *Economic growth and human development*. s.l.:Economic Growth Center, Yale University.
154. Randeree, K., 2012. Workforce nationalization in the Gulf Cooperation Council states. pp. 1-31.
155. Ranis, G., 2004. Human development and economic growth. *Yale University Economic Growth Center Discussion Paper*, Issue 887.
156. Ranis, G. & Fei, J. C., 1961. A theory of economic development. *The American Economic Review*, pp. 533-565.
157. Ranis, G. & Stewart, F., 2005. Dynamic links between the economy and human development. s.l.:United Nation (UN).
158. Ranis, G., Stewart, F. & Ramirez, A., 2000. Economic growth and human development. *World Development*, 28(2), pp. 197-219.
159. Raven, J., 2011. Emiratizing the education sector in the UAE: Contextualization and challenges. *Education, Business and Society: Contemporary Middle Eastern Issues*, 4(2), pp. 134-141.
160. Rioja, F. K., 1999. Productiveness and welfare implications of public infrastructure: a dynamic two-sector general equilibrium analysis. *Journal of Development Economics*, 58(2), pp. 387-404.
161. Rittenberg, L., 2011. *Principles of Microeconomics*. New York: Flat World Knowledge, Inc.
162. Robbins, L., 1968. The theory of economic development in the history of economic thought. s.l.:Macmillan London.
163. Robeyns, I., 2005. The capability approach: a theoretical survey. *Journal of human development*, 6(1), pp. 93-117.
164. Rodrik, D., 2016. Premature Deindustrialization. *Journal of Economic Growth*, 21(1), pp. 1-33.
165. Romer, D., 2001. Is Growth Exogenous? Taking Mankiw, Romer and Weil Seriously]: Comments. *NBER Macroeconomics Annual*, Volume 16, pp. 62-70.
166. Romer, P. M., 1990. Capital, labour, and productivity. *Brookings papers on economic activity. Microeconomics*, Volume 1990, pp. 337-367.
167. Ros, J., 2013. Rethinking economic development, growth, and institutions. s.l.:Oxford University Press.
168. Rostow, W. W., 1990. The stages of economic growth: A non-communist manifesto.
169. Sala-i-Martin, X., 2002. The disturbing" rise" of global income inequality.
170. Sala-i-Martin, X. X., 1997. I just ran two million regressions. *The American Economic Review*, pp. 178-183.
171. Salas, C. G., 2007. Macroeconomic and Welfare Effects of Public Infrastructure Investment in Five Latin American Countries. *Institute for Advanced Development Studies*.
172. Samuelson, P. A. & Nordhaus, W. D., 2010. *Economics*. Nineteenth International ed. NY: McGraw-Hill Education.
173. SAU, V., 2017. *Saudi Vision 2030*. [Online] Available at: <http://vision2030.gov.sa/en> [Accessed January 2017].

[Type here]

174. Savvides, A. & Stengos, T., 2008. *Human capital and economic growth*. s.l.:Stanford University Press.
175. Schmidt, S. S., 2008. The measurement of productive efficiency and productivity growth. s.l.:Oxford University Press.
176. Schultz, T. P., 2005. Productive benefits of health: Evidence from low-income countries.
177. Schultz, T. W., 1961. Investment in Human Capital. *American Economic Review*, Volume 51, pp. 1-17.
178. SCP, O., 2017. *Oman Future Vision 2040*. [Online] Available at: <https://www.scp.gov.om/en/> [Accessed January 2017].
179. Sen, A., 1985. Well-Being, Agency and Freedom: The Dewey Lectures 1984. *The Journal of Philosophy*, 82(4), pp. 169-221.
180. Sen, A., 1988. The concept of development. *Handbook of development economics*, 1, pp.9-26.
181. Sen, A., 2000. A decade of human development. *Journal of human development*, 1(1), pp. 17-23.
182. Sen, A., 2001. *Development as freedom*. s.l.:Oxford Paperbacks.
183. Sen, A., 2005. Human rights and capabilities. *Journal of human development*, 5(2), pp. 151-166.
184. Senay, A., Ben Ali, M. & Mert, M., 2017. Sources of economic growth in MENA countries: a Harrod-neutral technological progress identification framework (No. 2017-4). s.l.:Economics Discussion Papers.
185. Sengupta, J., 2011. Understanding Economic Growth: Modern Theory and Experience. s.l.:Springer Science & Business Media.
186. Sharipov, I., 2015. Contemporary Economic Growth Models And Theories: A Literature Review. *CES Working Papers*, 7(3), p.759.
187. Sharpe, A., 1999. *A survey of indicators of economic and social well-being*. Ottawa: Centre for the Study of Living Standards.
188. Shebeb, B., 2000. Productivity Decomposing Model: Theoretical Presentation. *Arab Economic Journal*, 9(21), pp. 3--19.
189. Shebeb, B., 2011. PRODUCTIVITY DECOMPOSITION: An Advanced Introduction. s.l.:Dr Bassim SHEBEB.
190. Shebeb, B., 2015. Analytical Decomposing of Labour Productivity Growth in Construction Industry of Bahrain. *Journal of Socialomics* , 18 December.137(5).
191. Shihab, M., 2001. Economic Development in the UAE. In: *UNITED ARAB EMIRATES: A NEW PERSPECTIVE*. s.l.:s.n., pp. 249-259.
192. Singh, N. & Trieu, H., 1999. Accounting for East Asian Growth: Japan, Korea and Taiwan. *Indian Economic Review*, Volume 12, pp. 118-134.
193. Smith, A. (1776). An Inquiry into the Nature and Causes of the Wealth of Nations.
194. Sobel, R. S. & Hall, J. C., 2007. THE SOURCES OF ECONOMIC GROWTH. In: s.l.:Unleashing Capitalism, pp. 1-28.
195. Solow, R. M., 1956. A Contribution to the Theory of Economic Growth. *The Quarterly Journal of Economics*, 70(1), pp. 65-94.

[Type here]

196. Solow, R. M., 1957. Technical change and the aggregate production function. *The review of Economics and Statistics*, pp. 312--320.
197. Solow, R. M., 1999. Neoclassical growth theory. *Handbook of macroeconomics*, Volume 1, pp. 637-667.
198. Sonobe, T. & Otsuka, K., 2001. A new decomposition approach to growth accounting: Derivation of the formula and its application to prewar Japan. *Japan and the World Economy*, 13(1), pp. 1-14.
199. Soto, R. & Haouas, I., 2012. Has the UAE Escaped the Oil Curse? (Working Paper 728). pp. 1-37.
200. Soubbotina, T. P., 2004. Beyond economic growth: An introduction to sustainable development. World Bank Publications.
201. Stanton, E. A., 2007. The human development index: A history.
202. Stiglitz, J.E., 2015. 8. Inequality and Economic Growth. *The Political Quarterly*, 86(S1), pp.134-155.
203. Storesletten, K. & Zilibotti, F., 2014. China's great convergence and beyond. *Annual Review of Economics*, 6(1), pp. 333-362.
204. Strauss, J., 1986. Does better nutrition raise farm productivity?. *The Journal of Political Economy*, pp. 297-320.
205. Suvakkin, M. & Gnanasekaran, G., 2015. A Study on Spectacular Growth of Services Sector In India. *International Journal of Management Research and Reviews*, 5(3), pp. 1-145.
206. Tachiciu, L., 2012. Contribution of Services to Economic Development. *The AMFITEATRU ECONOMIC journal*, 14 (Special No. 6), pp. 578-579.
207. Tinbergen, J., 1942. Professor Douglas' production function. *Revue de l'institut international de statistique*, pp. 37--48.
208. Tinbergen, J., 1956. On the theory of income distribution. *Weltwirtschaftliches archiv*, pp. 155-175.
209. Todaro, M. P. & Smith, S. C., 2005. *Economic development..* 11 ed. s.l.:Addison Wesley Longman.
210. Todaro, M. & Smith, S., 2015. *Economic Development.* 12 ed. s.l.:Pearson education.
211. Triplett, J. E. & Bosworth, B. P., 2004. *Productivity in the US services sector: new sources of economic growth.* s.l.:Brookings Institution Press.
212. UAE, 2010. United Arab Emirates, Yearbook 2010. *Social Development*, Volume 260, pp. 1-260.
213. UAE, 2013. United Arab Emirates Yearbook 2013, Dubai: Elite Media.
214. UAE, 2018. *UAE Vision 2021*. [online]  
Available at: <https://www.vision2021.ae/en>  
[Accessed 16 April 2018].
215. UN, 2016. World Statistics Pocketbook 2016 edition (Series V, No. 40), New York: United Nations.
216. UN, D., 2007. The United Nations Development Agenda: Development for All. *New York: UN*.
217. UNDP, U., 1990. Human Development Report 1990 : Concept and Measurement of Human Development, New York: Oxford University Press.

[Type here]

218. UNDP, U., 1993. Human Development Report 1993: People's Participation, NY: Oxford University Press.
219. UNDP, U., 1994. Human Development Report 1994: New Dimensions of Human Security, NY: Oxford University Press.
220. UNDP, U., 2000b. Human Development Report: 10 Years of Human Development Reports, 1990–1999, NY: Oxford University Press.
221. UNDP, U., 2010. Human Development Report 2010: The Real Wealth of Nations: Pathways to Human Development, NY: Oxford University Press.
222. UNDP, U., 2011. Human Development Report 2011: Sustainability and Equity: A Better Future for All, NY: Oxford University Press.
223. UNDP, U., 2015. Human Development Report 2014: Sustaining Human Progress: Reducing Vulnerabilities and Building Resilience, NY: Oxford University Press.
224. UNDP, U., 2015. Human Development Report 2015: Work for Human Development, NY: Oxford University Press.
225. UN, E., 1977. *Structure and change in European industry*. New York: United Nations (UN). Economic Commission for Europe.
226. Uppenberg, K. & Strauss, H., 2010. *Innovation and productivity growth in the EU services sector*. Luxembourg: European Investment Bank.
227. Waqas, H., 2015. *UAE Economic Outlook – 2015*. [Online] Available at: <http://www.researchkonnection.com/> [Accessed 18 December 2015].
228. Wesselink, B. et al., 2007. Measurement beyond GDP. *Beyond GDP*, pp. 1-21.
229. Willis, K., 2011. *Theories and practices of development*. s.l.:Taylor & Francis.
230. Wolfe, M., 1955. The concept of economic sectors. *The Quarterly Journal of Economics*, 69(3), pp. 402-420.
231. Wolff, E. N., 1994. Productivity measurement within an input-output framework. *Regional Science and Urban Economics*, 24(1), pp. 75-92.
232. WolframAlpha, 2016. *Wolfram/Alpha*. [Online] Available at: <https://www.wolframalpha.com> [Accessed 2016].
233. Worldbank, 2012. *World Development Indicators 2012*. s.l.:World Bank Group.
234. Worldbank, 2015. United Arab Emirates - World Bank Group Country Survey 2015. The World Bank.
235. Worldbank, 2016. *The World Bank*. [Online] Available at: <http://data.worldbank.org/country/united-arab-emirates> [Accessed 15 December 2016].
236. Worldbank, 2017. *World Development Indicators*. [Online] Available at: <http://data.worldbank.org/data-catalog/country-profiles> [Accessed January 2017].
237. Wu, Y., 2003. Has Productivity Contributed to China's Growth?. *Pacific Economic Review*, 8(1), pp. 15-30.
238. Young, A., 1994. Lessons from the East Asian NICs: a contrarian view. *European economic review*, 38(3), pp. 964-973.

[Type here]

239. Young, A. A., 1928. Increasing returns and economic progress. *The economic journal*, 38(152), pp. 527-542.

[Type here]

## LIST OF PUBLICATIONS

Yahya AL Shehhi

Accounting for Growth: Comparing Economic Sectors in the UAE.

*ANNALS OF THE UNIVERSITY OF ORADEA ECONOMIC SCIENCE* 26 (2) pp. 270-278. (2017)

Yahya Z AL Shehhi, József Popp

Sectoral Analysis: Growth accounting of Tertiary Industries

*SEA: PRACTICAL APPLICATION OF SCIENCE* 5:(14) pp. 221-230. (2017)

Yahya AL Shehhi, Judit Oláh

Sectoral Analysis: Growth Accounting of Secondary's Industries

*NETWORK INTELLIGENCE STUDIES* 5:(9) pp. 39-45. (2017)

Yahya AL Shehhi

Productivity Prosopopoeial in GCC's Countries: A Growth Accounting Perspective

*ANNALS OF THE UNIVERSITY OF ORADEA ECONOMIC SCIENCE* 26:(1) pp. 541-554. (2017)

Yahya AL Shehhi

Achievements in Terms of Human Development Dimensions: Case Study

*SEA: PRACTICAL APPLICATION OF SCIENCE* 5:(13) pp. 109-125. (2017)

Yahya AL Shehhi

Is Training a Sunken Cost?

*ANNALS OF THE UNIVERSITY OF ORADEA ECONOMIC SCIENCE* 25:(2) pp. 287-294. (2016)

Yahya AL Shehhi

Demand and supply of Labour Market: A Case of UAE

*APSTRACT - APPLIED STUDIES IN AGRIBUSINESS AND COMMERCE* 10:(4-5) pp. 145-154. (2016)

Sahar Zulfiqar , Hossam Haddad , Yahya AlShehhi , Domicián Máté

Financial performance of Islamic Bank in the United Arab Emirates, Pakistan and Jordan: a case comparative study with dupont approach

*ANNALS OF THE UNIVERSITY OF ORADEA ECONOMIC SCIENCE* 25:(2) pp. 403-410. (2016)

[Type here]

## LIST OF TABLES

TABLE 1. UAE'S POPULATION SHARE OF LABOUR FORCE, AND UNEMPLOYMENT RATE.....	49
TABLE 2. AGE DEPENDENCY RATE IN THE UAE (FROM 1990 TO 2015).....	50
TABLE 3. ACTIVE WORKERS BY ECONOMIC SECTOR (1990, 2001, 2010, 2015).....	51
TABLE 4. DEVELOPMENT VISIONS OF GCC'S MEMBER COUNTRIES. ....	57
TABLE 5. GDP PER CAPITA (CURRENT US \$) FOR THE PERIOD FROM 2001 TO 2014). ....	58
TABLE 6. ACCUMULATED GROWTH RATE OF NON-OIL SECTORS FROM 2001 TO 2014. ....	59
TABLE 7. MINING AND QUARRYING SECTOR AVERAGE CONTRIBUTION SHARE (%) TO GDP FROM 2001 TO 2014. ....	59
TABLE 8. TOTAL POPULATION OF GCC'S MEMBER COUNTRIES (2001- 2014).....	60
TABLE 9. UAE'S PROGRESS IN HDI IN 2014.....	77
TABLE 10. AVERAGE ANNUAL HDI GROWTH.....	78
TABLE 11. GENDER INEQUALITY INDEX (GII)'S DIMENSIONS IN 2014. ....	83
TABLE 12. UAE'S PUBLIC AND PRIVATE EDUCATIONAL SERVICES INDICATORS FOR YEAR 2000 AND 2014.....	84
TABLE 13. EDUCATION ACHIEVEMENTS (2008-2014). ....	85
TABLE 14. UAE'S HEALTHCARE INFRASTRUCTURE.....	86
TABLE 15. HEALTH OUTCOMES HDR IN 2015. ....	86
TABLE 16. GROWTH ACCOUNTING CALCULATION FOR ECONOMIC SECTORS FROM (1990-2015). ....	90
TABLE 17. GROWTH ACCOUNTING RESULTS OF THE SECONDARY SECTORS. ....	93
TABLE 18. GROWTH ACCOUNTING RESULTS OF THE TERTIARY INDUSTRIES.....	96
<b>TABLE 19. GROWTH ACCOUNTING RESULTS OF THE GCC COUNTRIES.....</b>	<b>101</b>

[Type here]

## LIST OF FIGURES

FIGURE 1. PRODUCTION FACTORS.....	19
FIGURE 2. TOTAL PRODUCTION AND INPUTS MOVING TREND (1990-2015). ....	46
<b>FIGURE 3. THE CONTRIBUTION OF OIL AND NON-OIL IN GDP'S TREND FROM (1990-2015).</b> .....	<b>47</b>
<b>FIGURE 4. LEVEL OF CONTRIBUTION OF NON-OIL INDUSTRIES TO UAE'S GDP.</b> .....	<b>47</b>
<b>FIGURE 5. NON-OIL INDUSTRIES'S CONTRIBUTION TO GDP FOR YEARS (1990-1995-2000-2010-2014-2015).</b> .....	<b>48</b>
FIGURE 6. UAE'S TOTAL POPULATION AND LABOUR FORCE. ....	49
<b>FIGURE 7. EMPLOYMENT RATE BY GROUP AGE (%).</b> .....	<b>50</b>
FIGURE 8. CIRCULAR FLOW OF DEMAND AND SUPPLY.....	52
FIGURE 9. UAE'S LABOUR AND CAPITAL PRODUCTIVITY (1990-2015).....	55
FIGURE 10. ANNUAL GROWTH RATE OF GDP FROM 2001 TO 2014. ....	56
FIGURE 11. THE CONTRIBUTION OF OIL SECTOR TO GDP'S SHARE FROM 2001 TO 2014 FOR GCC'S COUNTRIES. ....	57
FIGURE 12. CONTRIBUTION (%) AT TOTAL GCC'S GDP AT CURRENT PRICES (\$) IN 2014.....	58
FIGURE 13. PERCENTAGE (%) LABOUR INPUTS TO POPULATION IN 2001 AND 2014. ....	61
FIGURE 14. GROSS CAPITAL FORMATION TREND FOR WORLD AND GCC (2001-2014). ....	61
FIGURE 15. GCF'S DOLLAR (\$) VALUED TREND AND MOVING GROWTH RATE. ....	62
FIGURE 16. THE PRODUCTION FUNCTION. ....	64
FIGURE 17. UAE'S HDI RANKING HISTORY. ....	76
FIGURE 18. GCC'S HDI RANKING. ....	77
FIGURE 19. UNITED ARAB EMIRATES' HDI VALUE. ....	78
FIGURE 20. UAE HD'S DIMENSIONS TREND (1980 - 2014). ....	79
FIGURE 21. A COMPARISON OF HD COMPONENTS FROM (2010 - 2014).....	80
FIGURE 22. VALUE RATE (%) OF GENDER DEVELOPMENT INDEX (GDI). ....	81
FIGURE 23. GENDER INEQUALITY INDEX (GII) VALUES. ....	82
FIGURE 24. UAE'S AVERAGE ANNUAL GROWTH (%) BY MAJOR ECONOMIC SECTORS .....	89
FIGURE 25. SOURCE OF GROWTH (%) BY MAJOR ECONOMIC SECTORS. ....	91
FIGURE 26. UAE'S AVERAGE ANNUAL GROWTH (%) FOR SECONDARY INDUSTRIES. ....	93
FIGURE 27. SOURCE OF GROWTH (%) FOR SECONDARY INDUSTRIES. ....	94
FIGURE 28. UAE'S AVERAGE ANNUAL GROWTH (%) FOR TERTIARY INDUSTRIES.....	97
FIGURE 29. SOURCE OF GROWTH (%) FOR TERTIARY INDUSTRIES.....	98
FIGURE 30. OUTPUT AND TFP GROWTH FOR MEMBERS OF GCC REGION FROM 2001-2014. ....	100
FIGURE 31. LABOUR PRODUCTIVITY FROM (2001-2014).....	102
FIGURE 32. STRUCTURE OF THE AUTHOR'S RECOMMENDATION. ....	107

[Type here]

## LIST OF QUESTIONS

EQUATION 1.....	19
EQUATION 2.....	20
EQUATION 3.....	21
EQUATION 4.....	21
EQUATION 5.....	23
EQUATION 6.....	23
EQUATION 7.....	32
EQUATION 8.....	33
EQUATION 9.....	69
EQUATION 10.....	69
EQUATION 11.....	69
EQUATION 12.....	69
EQUATION 13.....	70
EQUATION 14.....	70
EQUATION 15.....	70
EQUATION 16.....	70
EQUATION 17.....	70
EQUATION 18.....	71
EQUATION 19.....	71
EQUATION 20.....	71
EQUATION 21.....	71
EQUATION 22.....	71
EQUATION 23.....	72
EQUATION 24.....	72
EQUATION 25.....	73
EQUATION 26.....	73
EQUATION 27.....	74

[Type here]

## **ACKNOWLEDGMENTS**

I extend my thanks and appreciation to the supervisor of this thesis, Prof. József Popp for his valuable guidance, motivation, patience, tremendous knowledge, enthusiasm, and continuous interest in following up this work at various stages. Also, extend my thanks to others for their supervision, encouragement, and understanding.

I would also like to thank the distinguished professors of the discussion committee for accepting the discussion and evaluation of this thesis. I would also like to extend my sincere thanks to the teaching staff for helping and guiding in the way to complete the study and colleagues for their encouragement and to all those who have helped me to prepare this thesis.

[Type here]

## ATTACHMENTS

### 1. UAE's data-set of economic sectors

Code	Period	Aggergate economy			Primary sector			Secondary sector			Tertiary sector		
		GDP (Y)	Capital (K)	Worker (L)	GDP(Y)	Capital (K)	Worker (L)	GDP(Y)	Capital (K)	Worker (L)	GDP(Y)	Capital (K)	Worker (L)
UAE	1990	189465	24064	644644	1970	311	43296	110347	14257	216468	96186	9496	384880
UAE	1991	192993	25787	683568	2456	421	57733	107930	14663	224937	102984	10703	400898
UAE	1992	202746	29805	710317	2745	487	58627	110105	16466	231664	111889	12852	420026
UAE	1993	208059	33779	778733	3024	819	63964	105123	18440	261270	126102	14520	453499
UAE	1994	222297	44081	893541	3985	985	72495	106992	19740	291609	106732	23356	529437
UAE	1995	246319	44693	955669	4313	831	80604	117077	20387	309116	119955	23475	565949
UAE	1996	276015	47300	989633	4841	990	85038	133076	22112	321110	132162	24198	583485
UAE	1997	295905	50951	1233062	5800	1058	106712	141483	21222	482806	142135	28671	643544
UAE	1998	286898	52194	1293455	6061	1554	112707	121733	20493	503200	150120	30147	677548
UAE	1999	318140	53916	1411848	7236	1413	115916	141936	21677	517022	160953	30826	778910
UAE	2000	389760	57370	1459722	8670	1540	119242	201127	24590	534015	173383	31240	806465
UAE	2001	387715	79593	1736176	8492	839	154043	188478	28475	614005	190745	50279	968128
UAE	2002	413204	84981	1978475	8886	836	163192	191752	31179	755665	212566	52966	1059618
UAE	2003	467940	94947	2134581	8803	828	166428	224317	34659	833911	234820	59460	1134242
UAE	2004	556222	101433	2258905	9041	822	168574	280554	38366	881781	266627	62245	1208550
UAE	2005	682659	121912	2577661	9256	848	157044	369095	44562	995352	304307	76502	1425265
UAE	2006	837176	143390	2854838	8926	862	166022	472330	52149	1110860	355919	90379	1577956
UAE	2007	978182	223283	3521956	9251	843	175023	519445	66003	1456415	449486	156436	1890518
UAE	2008	1199974	259220	4518264	9585	913	222642	672186	105825	1875561	518203	152481	2420061

[Type here]

UAE	2009	976353	269225	4502999	9655	918	229691	484618	113482	1813156	482080	154824	2460152
UAE	2010	1096554	262571	4507740	8992	771	229933	577151	114836	1815064	510411	146964	2462743
UAE	2011	1309296	274258	4726904	9354	835	241112	748125	109587	1903311	551816	163836	2582480
UAE	2012	1402216	300445	4844873	9483	874	247130	793602	125196	1950812	599131	174375	2646931
UAE	2013	1465555	309839	4891953	9681	897	249531	787419	126930	1969769	668455	182013	2672653
UAE	2014	1519913	336945	4916846	10085	976	250801	786160	136613	1979792	723667	199355	2686252
UAE	2015	1405765	354435	4965569	10527	1027	253286	616525	143705	1999411	778713	209704	2712872

[Type here]

## 2. UAE's data-set of economic secondary industries.

Code	Period	MQ			MFG			EGW			CN		
		GDP(Y)	Capital	Worker	GDP(Y)	Capital	Worker	GDP(Y)	Capital	Worker	GDP(Y)	Capital	Worker
		)	(K)	(L)	)	(K)	(L)	)	(K)	(L)	)	(K)	(L)
UAE	1990	73073	6986	10030	13948	3956	66530	3176	2444	20678	20150	871	119230
UAE	1991	68839	6945	10680	14048	4208	67250	3484	2545	20762	21560	965	126245
UAE	1992	68220	7620	10916	15100	4725	69320	3727	2921	21078	23058	1200	130350
UAE	1993	60155	8020	11670	16017	5310	87650	3573	3200	21850	25377	1910	140100
UAE	1994	56671	6947	12067	20621	5327	114000	3884	5420	22292	25816	2046	143250
UAE	1995	61088	6999	12609	23501	5973	118800	4169	5200	23407	28319	2215	154300
UAE	1996	72687	7270	13129	25775	7215	122420	4472	5227	24451	30143	2400	161110
UAE	1997	71031	7689	24102	32856	7585	184060	5121	3348	23044	32475	2600	251600
UAE	1998	47822	6505	24642	34489	6793	196903	5325	4470	24355	34097	2725	257300
UAE	1999	63506	7303	26332	38159	7740	202320	5698	3764	28370	34573	2870	260000
UAE	2000	110126	8480	23465	49982	8810	213400	5955	4250	29850	35064	3050	267300
UAE	2001	95365	6514	30248	50514	10653	246910	6310	7293	31370	36289	4015	305477
UAE	2002	94406	6879	31702	52685	12114	276476	6917	7762	26591	37744	4424	420896
UAE	2003	115528	7289	32911	55998	13745	299064	8703	8829	28359	44088	4796	473577
UAE	2004	158912	7777	35575	62499	15484	319384	10129	10058	28848	49014	5047	497974
UAE	2005	228206	8693	38194	70365	17803	372553	12612	11575	34807	57912	6491	549798
UAE	2006	306051	10145	41332	78775	21167	404565	15096	12795	37751	72409	8042	627212
UAE	2007	321845	11706	48814	85490	22415	422674	17396	18070	43563	94714	13812	941364
UAE	2008	429105	22892	62374	99641	32201	533849	21197	33509	55729	122242	17223	1223609
UAE	2009	254252	38078	64350	85623	35695	551616	24093	28272	57494	120650	11438	1139696
UAE	2010	334147	38047	64417	94546	40336	553052	25706	22736	57554	122752	13718	1140041
UAE	2011	506053	34479	67549	111772	41010	579941	8096	22577	60352	122204	11522	1195469

[Type here]

UAE	2012	542168	42082	69235	121816	45140	594415	9173	25649	61858	120445	12325	1225305
UAE	2013	534269	42823	69908	117531	46461	600191	10113	24107	62460	125506	13538	1237211
UAE	2014	510871	45101	70263	125549	50192	603245	11067	26460	62777	138674	14860	1243507
UAE	2015	322852	47442	70960	134069	52797	609223	12189	27834	63399	147415	15631	1255829

[Type here]

### 3. UAE's data-set of economic secondary industries.

Period	WRTRS			RH			TSC			REBS			SPS			FCS			GSS		
	Y	K	L	Y	K	L	Y	K	L	Y	K	L	Y	K	L	Y	K	L	Y	K	L
1990	31546	1467	101370	2756			9139	3756	72047	11752	986	3100	2927	144	78141	10627	54	16061	8402	3089	114161
1991	33733	2247	104817	2852			9874	4114	75223	12746	1100	3325	3191	153	85166	11377	90	16699	8833	2999	115668
1992	37580	2416	109210	3157			10687	5194	77217	14009	1430	3470	3504	168	92831	11618	93	16862	9341	3551	120436
1993	40767	2620	159555	3448			11658	5010	82323	16309	2475	24220	3892	190	41220	13739	105	16933	10099	4120	129248
1994	44902	1413	183075	3696	1628	33220	12601	5871	85827	26903	6931	26852	3805	238	52500	9103	114	16858	10310	7161	131105
1995	47609	1498	197570	3890	1826	36720	15504	6882	93615	32573	8597	29210	4043	281	55920	10484	159	17392	10825	4232	135522
1996	53868	1559	202620	5108	1972	38810	16456	7229	94906	34962	8680	31745	4546	300	57300	11726	169	18017	11431	4289	140087
1997	59168	1900	226562	6288	2231	56687	17615	8806	97473	35455	9810	33285	5032	370	61750	13102	220	20915	11963	5334	146872
1998	62012	2038	236292	7135	2281	63445	19638	10310	100215	36620	9617	34900	5281	394	65510	15452	236	22527	12964	5271	154659
1999	63729	2267	311604	8316	2450	70305	22434	10852	104517	38113	10478	35925	5615	524	70010	16211	279	22878	14550	3976	163671
2000	65898	2405	320520	8855	2532	72008	25377	9977	107874	39531	10946	36950	6108	590	74560	17634	280	23489	16560	4510	171064
2001	67585	2817	370827	9576	2734	84001	29251	10481	127243	39543	18123	56495	7493	1642	90511	19987	1182	24825	17310	13299	214226
2002	73215	3193	415974	10469	3461	94930	34235	11166	130923	45549	18188	63664	8646	2059	91035	22041	1306	25724	18410	13593	237368
2003	78797	3779	450208	11243	4002	98509	37731	12897	142548	52422	19008	67107	9781	2589	99328	24929	1480	26368	19917	15704	250174
2004	83738	4003	478716	11908	4770	109931	46344	13152	147807	62802	19518	73817	11163	3020	106700	29791	1768	27011	20881	16015	264568
2005	90108	11204	586226	13358	6102	121216	52196	15262	184766	71171	23441	87694	12147	3391	123137	42196	1938	35791	23131	15164	286435
2006	107263	13275	640280	15830	6865	131707	61988	16666	202615	81494	29653	97226	13737	3865	134888	51091	2182	41673	24516	17874	329567
2007	132166	23228	724010	17939	7972	159032	76088	24368	258664	111180	64693	148241	16666	6981	145538	67872	5596	54595	27575	23599	400438
2008	147590	14177	923960	21356	4300	203718	88815	32374	333912	125697	48055	192582	20859	8097	183804	74310	3525	69940	39576	41953	512145
2009	123849	10396	953217	19587	4661	210168	88518	29754	307947	109469	41911	198335	21916	5814	189969	73297	5011	72154	45444	57276	528362
2010	131954	12340	954220	21566	4097	210389	89517	32068	308271	112621	43190	198202	23586	8567	190511	74017	7472	72232	57151	39230	528918
2011	135984	12695	1000614	25047	5390	220618	100764	40328	323259	121123	43063	207838	29833	14823	199774	78862	5298	75744	60204	42238	554634
2012	143719	14930	1025586	27316	6004	226124	107123	43986	331327	132791	45751	213026	32868	16217	204759	87353	6988	77634	67961	40499	568476
2013	158411	15806	1035552	31449	6522	228321	111498	44610	334546	149814	50771	215096	32004	17657	206749	108327	7865	78389	76953	38782	574000
2014	163800	16446	1040821	34204	7159	229483	121137	54453	336249	164591	51717	216190	34608	18380	207801	122418	8633	78788	82909	42567	576921
2015	174316	17300	1051135	35619	7531	231757	131697	57280	339581	180467	54401	218332	37776	19335	209860	132766	9081	79568	86073	44777	582638

### 4. Estimation number of active workers from 2011-2015.

[Type here]

INDUSTRIES	2010	The ratio of each industry to the total number of workers in the country. The formula= (Industry's workers yr 2010/Economy's total workers yr 2010*100)	UAE's Population		The ratio of workers to the total population = formula (total workers yr 2010/total population*100)		Active Workers		2011	2012	2013	2014	2015
			2010	2011	2012	2013	2014	2015	Active worker's estimation	Active worker's estimation	Active worker's estimation	Active worker's estimation	Active worker's estimation
- Agriculture, Live stock and Fishing	229933	4.69%	2010	8,330,000	2010	58.87%	2010	4,903,968	241,112	247,130	249,531	250,801	252,733
- Mining and Quarrying:	64417	1.31%	2011	8,735,000	2011	58.87%	2011	5,142,396	67,549	69,235	69,908	70,263	70,805
* Crude oil and Natural Gas	53525		2012	8,953,000	2012	58.87%	2012	5,270,735					
* Quarrying	10892		2013	9,040,000	2013	58.87%	2013	5,321,953					
- Manufacturing Industries	553052	11.28%	2014	9,086,000	2014	58.87%	2014	5,349,034	579,941	594,415	600,191	603,245	607,892
- Electricity, Gas and water	57554	1.17%	2015	9,156,000	2015	58.87%	2015	5,390,244	60,352	61,858	62,460	62,777	63,261
- Construction	1140041	23.25%	Population sourced from World Bank country database		Estimation of active workers. Same ratio used for every next year after yr 2010		Active workers = 59%*population then exclude the Domestic Services of Households, because there was no data from 1990-2000. Therefore, the author excluded this figure from the caculations		1,195,469	1,225,305	1,237,211	1,243,507	1,253,087
- Wholesale Retail Trade and Repairing Services	954220	19.46%							1,000,614	1,025,586	1,035,552	1,040,821	1,048,840
- Restaurants and Hotels	210389	4.29%							220,618	226,124	228,321	229,483	231,251
- Transports, Storage and Communication	308271	6.29%							323,259	331,327	334,546	336,249	338,839
- Real Estate and business Services	198202	4.04%							207,838	213,026	215,096	216,190	217,856
- Social and Personal Services	190511	3.88%							199,774	204,759	206,749	207,801	209,402
The Financial Corporations Sector	72232	1.47%							75,744	77,634	78,389	78,788	79,395
Government Services Sector	528918	10.79%							554,634	568,476	574,000	576,921	581,365
- Domestic Services of Households	396228	8.08%							415,492	425,862	430,000	432,188	435,518
<b>TOTAL</b>	<b>4,903,968</b>	100%							<b>4,726,904</b>	<b>4,844,873</b>	<b>4,891,953</b>	<b>4,916,846</b>	<b>4,954,726</b>

[Type here]

### 5. Sectoral approach; growth accounting calculations for primary sector.

Period		GDP	Capital (K)	Worker	$\Delta$ GDP/GDP	$\Delta$ K/K	$\Delta$ L/L	$\alpha$	1- $\alpha$	$\Delta$ Y/Y	$\alpha \cdot \Delta$ K/K	1- $\alpha(\Delta$ L/L)	TFP
1990		1,970	311	43,296				0.333333333	0.666666667				
1991		2,456	421	57,733	0.2204161	0.302839922	0.2877686818	0.333333333	0.666666667	22.04%	10.09%	19.18%	-7.24%
1992		2,745	487	58,627	0.111389903	0.145631289	0.0153664076	0.333333333	0.666666667	11.14%	4.85%	1.02%	5.26%
1993		3,024	819	63,964	0.096737053	0.519819961	0.0871250838	0.333333333	0.666666667	9.67%	17.33%	5.81%	-13.46%
1994		3,985	985	72,495	0.275728786	0.184557557	0.1251971689	0.333333333	0.666666667	27.57%	6.15%	8.35%	13.07%
1995		4,313	831	80,604	0.079265405	-0.170011846	0.1060306821	0.333333333	0.666666667	7.93%	-5.67%	7.07%	6.52%
1996		4,841	990	85,038	0.11548461	0.175075148	0.0535499393	0.333333333	0.666666667	11.55%	5.84%	3.57%	2.14%
1997		5,800	1,058	106,712	0.180604591	0.066430669	0.2270354014	0.333333333	0.666666667	18.06%	2.21%	15.14%	0.71%
1998		6,061	1,554	112,707	0.044121239	0.384451919	0.0546579141	0.333333333	0.666666667	4.41%	12.82%	3.64%	-12.05%
1999		7,236	1,413	115,916	0.17716997	-0.095117148	0.0280742599	0.333333333	0.666666667	17.72%	-3.17%	1.87%	19.02%
2000		8,670	1,540	119,242	0.180753206	0.086067313	0.0282892507	0.333333333	0.666666667	18.08%	2.87%	1.89%	13.32%
2001	Primary Sector	8,492	839	154,043	-0.020660738	-0.606910854	0.2560767427	0.333333333	0.666666667	-2.07%	-20.23%	17.07%	1.09%
2002		8,886	836	163,192	0.045364464	-0.004416976	0.0576956375	0.333333333	0.666666667	4.54%	-0.15%	3.85%	0.84%
2003		8,803	828	166,428	-0.009449634	-0.008755769	0.0196353617	0.333333333	0.666666667	-0.94%	-0.29%	1.31%	-1.96%
2004		9,041	822	168,574	0.026744992	-0.007317186	0.0128120391	0.333333333	0.666666667	2.67%	-0.24%	0.85%	2.06%
2005		9,256	848	157,044	0.02347282	0.030743726	-0.0708488017	0.333333333	0.666666667	2.35%	1.02%	-4.72%	6.05%
2006		8,926	862	166,022	-0.036284254	0.016393396	0.0555942888	0.333333333	0.666666667	-3.63%	0.55%	3.71%	-7.88%
2007		9,251	843	175,023	0.035726424	-0.021802588	0.0527970842	0.333333333	0.666666667	3.57%	-0.73%	3.52%	0.78%
2008		9,585	913	222,642	0.035463665	0.079792527	0.2406477064	0.333333333	0.666666667	3.55%	2.66%	16.04%	-15.16%
2009		9,655	918	229,691	0.007250575	0.004932764	0.0311698271	0.333333333	0.666666667	0.73%	0.16%	2.08%	-1.52%
2010		8,992	771	229,933	-0.07110482	-0.17472439	0.0010530348	0.333333333	0.666666667	-7.11%	-5.82%	0.07%	-1.36%
2011		9,354	835	241,112	0.039512048	0.080457763	0.0474744874	0.333333333	0.666666667	3.95%	2.68%	3.16%	-1.90%
2012		9,483	874	247,130	0.013654828	0.045258264	0.0246507281	0.333333333	0.666666667	1.37%	1.51%	1.64%	-1.79%
2013		9,681	897	249,531	0.020614598	0.025638449	0.0096705028	0.333333333	0.666666667	2.06%	0.85%	0.64%	0.56%
2014		10,085	976	250,801	0.040956625	0.084982029	0.0050755929	0.333333333	0.666666667	4.10%	2.83%	0.34%	0.92%

[Type here]

<b>2015</b>		10,527	1,027	253,286	0.042859918	0.050606527	0.0098606755	<b>0.333333333</b>	<b>0.666666667</b>	4.29%	1.69%	0.66%	1.94%
<b>AVERAGE</b>									<b>(1990-2015)</b>	6.70%	1.59%	4.71%	0.40%
									<b>(1990-2000)</b>	14.82%	5.33%	6.75%	2.73%
									<b>(2000-2010)</b>	1.98%	-1.84%	4.15%	-0.34%
									<b>(2010-2015)</b>	1.44%	0.62%	1.09%	-0.27%

[Type here]

## 6. Sectoral approach; growth accounting calculations for secondary sector.

Period		GDP	Capital (K)	Worker	$\Delta$ GDP/GDP	$\Delta$ K/K	$\Delta$ L/L	$\alpha$	1- $\alpha$	$\Delta$ Y/Y	$\alpha \cdot \Delta$ K/K	1- $\alpha(\Delta$ L/L)	TFP
1990		110,347	14,257	216,468				0.333333333	0.666666667				
1991		107,930	14,663	224,937	-0.022144607	0.0280793	0.0383776325	0.333333333	0.666666667	-2.21%	0.94%	2.56%	-5.71%
1992		110,105	16,466	231,664	0.019945354	0.115970335	0.0294676830	0.333333333	0.666666667	1.99%	3.87%	1.96%	-3.84%
1993		105,123	18,440	261,270	-0.046304661	0.113224569	0.1202663093	0.333333333	0.666666667	-4.63%	3.77%	8.02%	-16.42%
1994		106,992	19,740	291,609	0.01762901	0.068124816	0.1098595085	0.333333333	0.666666667	1.76%	2.27%	7.32%	-7.83%
1995		117,077	20,387	309,116	0.090075557	0.032250409	0.0583027471	0.333333333	0.666666667	9.01%	1.08%	3.89%	4.05%
1996		133,076	22,112	321,110	0.128092673	0.081223005	0.0380671326	0.333333333	0.666666667	12.81%	2.71%	2.54%	7.56%
1997		141,483	21,222	482,806	0.061253732	-0.041082068	0.4078311731	0.333333333	0.666666667	6.13%	-1.37%	27.19%	-19.69%
1998		121,733	20,493	503,200	-0.150345746	-0.034955015	0.0413727887	0.333333333	0.666666667	-15.03%	-1.17%	2.76%	-16.63%
1999		141,936	21,677	517,022	0.153547281	0.056168426	0.0270977214	0.333333333	0.666666667	15.35%	1.87%	1.81%	11.68%
2000		201,127	24,590	534,015	0.348556627	0.126088066	0.0323385017	0.333333333	0.666666667	34.86%	4.20%	2.16%	28.50%
2001	Secondary	188,478	28,475	614,005	-0.064954185	0.146689291	0.1395791430	0.333333333	0.666666667	-6.50%	4.89%	9.31%	-20.69%
2002	Sector	191,752	31,179	755,665	0.017222033	0.090730045	0.2075950848	0.333333333	0.666666667	1.72%	3.02%	13.84%	-15.14%
2003		224,317	34,659	833,911	0.156855199	0.105793583	0.0985285258	0.333333333	0.666666667	15.69%	3.53%	6.57%	5.59%
2004		280,554	38,366	881,781	0.223706797	0.10162686	0.0558170438	0.333333333	0.666666667	22.37%	3.39%	3.72%	15.26%
2005		369,095	44,562	995,352	0.27428793	0.149701844	0.1211527176	0.333333333	0.666666667	27.43%	4.99%	8.08%	14.36%
2006		472,330	52,149	1,110,860	0.246624752	0.15722059	0.1097933257	0.333333333	0.666666667	24.66%	5.24%	7.32%	12.10%
2007		519,445	66,003	1,456,415	0.095082504	0.235597522	0.2708434465	0.333333333	0.666666667	9.51%	7.85%	18.06%	-16.40%
2008		672,186	105,825	1,875,561	0.257773445	0.472090363	0.2529298780	0.333333333	0.666666667	25.78%	15.74%	16.86%	-6.82%
2009		484,618	113,482	1,813,156	-0.327174074	0.06985836	-0.0338388414	0.333333333	0.666666667	-32.72%	2.33%	-2.26%	-32.79%
2010		577,151	114,836	1,815,064	0.174744058	0.011860293	0.0010517555	0.333333333	0.666666667	17.47%	0.40%	0.07%	17.01%
2011		748,125	109,587	1,903,311	0.259466133	-0.046788054	0.0474744874	0.333333333	0.666666667	25.95%	-1.56%	3.16%	24.34%
2012		793,602	125,196	1,950,812	0.059011897	0.133158773	0.0246507281	0.333333333	0.666666667	5.90%	4.44%	1.64%	-0.18%
2013		787,419	126,930	1,969,769	-0.007821803	0.01375513	0.0096705028	0.333333333	0.666666667	-0.78%	0.46%	0.64%	-1.89%
2014		786,160	136,613	1,979,792	-0.00160009	0.073520196	0.0050755929	0.333333333	0.666666667	-0.16%	2.45%	0.34%	-2.95%

[Type here]

2015		616,525	143,705	1,999,411	-0.243061989	0.050606527	0.0098606755	0.333333333	0.666666667	-24.31%	1.69%	0.66%	-26.65%
<b>AVERAGE</b>									(1990-2015)	6.88%	3.08%	5.93%	-2.13%
									(1990-2000)	6.00%	1.82%	6.02%	-1.83%
									(2000-2010)	12.75%	5.05%	7.61%	0.09%
									(2010-2015)	4.01%	1.31%	1.09%	1.61%

[Type here]

### 7. Sectoral approach; growth accounting calculations for tertiary sector.

Period		GDP	Capital (K)	Worker	$\Delta$ GDP/GDP	$\Delta$ K/K	$\Delta$ L/L	$\alpha$	1- $\alpha$	$\Delta$ Y/Y	$\alpha \cdot \Delta$ K/K	1- $\alpha(\Delta$ L/L)	TFP
1990		96,186	9,496	384,880				0.333333333	0.666666667				
1991		102,984	10,703	400,898	0.068287647	0.119653419	0.0407754335	0.333333333	0.666666667	6.83%	3.99%	2.72%	0.12%
1992		111,889	12,852	420,026	0.082931312	0.182975365	0.0466095833	0.333333333	0.666666667	8.29%	6.10%	3.11%	-0.91%
1993		126,102	14,520	453,499	0.119580986	0.122027568	0.0766764504	0.333333333	0.666666667	11.96%	4.07%	5.11%	2.78%
1994		106,732	23,356	529,437	-0.166763743	0.475326901	0.1548211133	0.333333333	0.666666667	-16.68%	15.84%	10.32%	-42.84%
1995		119,955	23,475	565,949	0.116789151	0.005082115	0.0666897903	0.333333333	0.666666667	11.68%	0.17%	4.45%	7.06%
1996		132,162	24,198	583,485	0.096916699	0.03033396	0.0305147763	0.333333333	0.666666667	9.69%	1.01%	2.03%	6.65%
1997		142,135	28,671	643,544	0.072749256	0.169616174	0.0979716563	0.333333333	0.666666667	7.27%	5.65%	6.53%	-4.91%
1998		150,120	30,147	677,548	0.054654413	0.050199257	0.0514899982	0.333333333	0.666666667	5.47%	1.67%	3.43%	0.36%
1999		160,953	30,826	778,910	0.069680585	0.022273074	0.1394151075	0.333333333	0.666666667	6.97%	0.74%	9.29%	-3.07%
2000		173,383	31,240	806,465	0.074387997	0.013340835	0.0347649928	0.333333333	0.666666667	7.44%	0.44%	2.32%	4.68%
2001	Tertiary Sector	190,745	50,279	968,128	0.095435682	0.475888428	0.1827038107	0.333333333	0.666666667	9.54%	15.86%	12.18%	-18.50%
2002		212,566	52,966	1,059,618	0.108313269	0.052061074	0.0902994349	0.333333333	0.666666667	10.83%	1.74%	6.02%	3.08%
2003		234,820	59,460	1,134,242	0.09956917	0.115647724	0.0680561206	0.333333333	0.666666667	9.96%	3.85%	4.54%	1.56%
2004		266,627	62,245	1,208,550	0.127030474	0.045775703	0.0634567075	0.333333333	0.666666667	12.70%	1.53%	4.23%	6.95%
2005		304,307	76,502	1,425,265	0.132187662	0.206244629	0.1649364674	0.333333333	0.666666667	13.22%	6.87%	11.00%	-4.65%
2006		355,919	90,379	1,577,956	0.15666496	0.166695717	0.1017725773	0.333333333	0.666666667	15.67%	5.56%	6.78%	3.33%
2007		449,486	156,436	1,890,518	0.233402088	0.548635574	0.1807205270	0.333333333	0.666666667	23.34%	18.29%	12.05%	-7.00%
2008		518,203	152,481	2,420,061	0.142261748	-0.025607242	0.2469418809	0.333333333	0.666666667	14.23%	-0.85%	16.46%	-1.38%
2009		482,080	154,824	2,460,152	-0.072256168	0.015249166	0.0164303902	0.333333333	0.666666667	-7.23%	0.51%	1.10%	-8.83%
2010		510,411	146,964	2,462,743	0.0571049	-0.052104757	0.0010526327	0.333333333	0.666666667	5.71%	-1.74%	0.07%	7.38%
2011		551,816	163,836	2,582,480	0.077998889	0.108678872	0.0474744874	0.333333333	0.666666667	7.80%	3.62%	3.16%	1.01%
2012		599,131	174,375	2,646,931	0.082264739	0.062342471	0.0246507281	0.333333333	0.666666667	8.23%	2.08%	1.64%	4.51%
2013		668,455	182,013	2,672,653	0.109489515	0.042868721	0.0096705028	0.333333333	0.666666667	10.95%	1.43%	0.64%	8.88%
2014		723,667	199,355	2,686,252	0.079362873	0.091013331	0.0050755929	0.333333333	0.666666667	7.94%	3.03%	0.34%	4.56%

[Type here]

2015		778,713	209,704	2,712,872	0.073310817	0.050606527	0.0098606755	0.333333333	0.666666667	7.33%	1.69%	0.66%	4.99%
<b>AVERAGE</b>									(1990-2015)	8.37%	4.13%	5.21%	-0.97%
									(1990-2000)	5.89%	3.97%	4.93%	-3.01%
									(2000-2010)	10.49%	4.73%	6.98%	-1.22%
									(2010-2015)	7.99%	1.69%	1.09%	5.22%

[Type here]

### 8. Industry approach; growth accounting calculations for mining and quarrying industry.

Period		GDP	Capital (K)	Worker	$\Delta$ GDP/GDP	$\Delta$ K/K	$\Delta$ L/L	$\alpha$	1- $\alpha$	$\Delta$ Y/Y	$\alpha \cdot \Delta$ K/K	1- $\alpha(\Delta$ L/L)	TFP
1990		73,073	6,986	10,030				0.333333333	0.666666667	0.00	0.00	0.00	0.00
1991		68,839	6,945	10,680	-0.059697723	-0.00588617	0.0627922316	0.333333333	0.666666667	-5.97%	-0.20%	4.19%	-9.96%
1992		68,220	7,620	10,916	-0.009024358	0.092754393	0.0218567693	0.333333333	0.666666667	-0.90%	3.09%	1.46%	-5.45%
1993		60,155	8,020	11,670	-0.125816589	0.051162052	0.0667918435	0.333333333	0.666666667	-12.58%	1.71%	4.45%	-18.74%
1994		56,671	6,947	12,067	-0.059665024	-0.14362851	0.0334530078	0.333333333	0.666666667	-5.97%	-4.79%	2.23%	-3.41%
1995		61,088	6,999	12,609	0.075057345	0.00745737	0.0439363906	0.333333333	0.666666667	7.51%	0.25%	2.93%	4.33%
1996		72,687	7,270	13,129	0.173845049	0.03798901	0.0404126793	0.333333333	0.666666667	17.38%	1.27%	2.69%	13.42%
1997		71,031	7,689	24,102	-0.023044667	0.056034445	0.6074713007	0.333333333	0.666666667	-2.30%	1.87%	40.50%	-44.67%
1998		47,822	6,505	24,642	-0.395635979	-0.167219624	0.0221574796	0.333333333	0.666666667	-39.56%	-5.57%	1.48%	-35.47%
1999		63,506	7,303	26,332	0.28365961	0.115714111	0.0663326254	0.333333333	0.666666667	28.37%	3.86%	4.42%	20.09%
2000		110,126	8,480	23,465	0.55048393	0.149425227	-0.1152749804	0.333333333	0.666666667	55.05%	4.98%	-7.68%	57.75%
2001	MQ	95,365	6,514	30,248	-0.143911835	-0.263756743	0.2539201173	0.333333333	0.666666667	-14.39%	-8.79%	16.93%	-22.53%
2002		94,406	6,879	31,702	-0.010107004	0.054519586	0.0469497038	0.333333333	0.666666667	-1.01%	1.82%	3.13%	-5.96%
2003		115,528	7,289	32,911	0.201908294	0.05789307	0.0374271780	0.333333333	0.666666667	20.19%	1.93%	2.50%	15.77%
2004		158,912	7,777	35,575	0.318837665	0.064804297	0.0778361956	0.333333333	0.666666667	31.88%	2.16%	5.19%	24.53%
2005		228,206	8,693	38,194	0.36189814	0.111347444	0.0710352912	0.333333333	0.666666667	36.19%	3.71%	4.74%	27.74%
2006		306,051	10,145	41,332	0.293503025	0.154462869	0.0789585831	0.333333333	0.666666667	29.35%	5.15%	5.26%	18.94%
2007		321,845	11,706	48,814	0.050318308	0.143120558	0.1663801386	0.333333333	0.666666667	5.03%	4.77%	11.09%	-10.83%
2008		429,105	22,892	62,374	0.287631581	0.670685974	0.2451313649	0.333333333	0.666666667	28.76%	22.36%	16.34%	-9.94%
2009		254,252	38,078	64,350	-0.523375743	0.508849183	0.0311884122	0.333333333	0.666666667	-52.34%	16.96%	2.08%	-71.38%
2010		334,147	38,047	64,417	0.273255115	-0.00081445	0.0010406394	0.333333333	0.666666667	27.33%	-0.03%	0.07%	27.28%
2011		506,053	34,479	67,549	0.415060391	-0.098471795	0.0474744874	0.333333333	0.666666667	41.51%	-3.28%	3.16%	41.62%
2012		542,168	42,082	69,235	0.06893451	0.199279913	0.0246507281	0.333333333	0.666666667	6.89%	6.64%	1.64%	-1.39%
2013		534,269	42,823	69,908	-0.014676567	0.017451653	0.0096705028	0.333333333	0.666666667	-1.47%	0.58%	0.64%	-2.69%
2014		510,871	45,101	70,263	-0.044782433	0.051827602	0.0050755929	0.333333333	0.666666667	-4.48%	1.73%	0.34%	-6.54%

[Type here]

2015		322,852	47,442	70,960	-0.458923696	0.050606527	0.0098606755	0.333333333	0.666666667	-45.89%	1.69%	0.66%	-48.24%	
<b>AVERAGE</b>										(1990-2015)	5.71%	2.46%	5.02%	-1.76%
										(1990-2000)	4.10%	0.65%	5.67%	-2.21%
										(2000-2010)	15.09%	5.00%	5.42%	4.67%
										(2010-2015)	3.98%	1.22%	1.09%	1.67%

[Type here]

### 9. Industry approach; growth accounting calculations for manufacturing industry.

Period		GDP	Capital (K)	Worker	$\Delta$ GDP/GDP	$\Delta$ K/K	$\Delta$ L/L	$\alpha$	1- $\alpha$	$\Delta$ Y/Y	$\alpha \cdot \Delta$ K/K	1- $\alpha(\Delta$ L/L)	TFP
1990		13,948	3,956	66,530				0.333333333	0.666666667				
1991		14,048	4,208	67,250	0.007087493	0.061754062	0.0107640447	0.333333333	0.666666667	0.71%	2.06%	0.72%	-2.07%
1992		15,100	4,725	69,320	0.072249249	0.115880086	0.0303164464	0.333333333	0.666666667	7.22%	3.86%	2.02%	1.34%
1993		16,017	5,310	87,650	0.058976519	0.116724274	0.2346181465	0.333333333	0.666666667	5.90%	3.89%	15.64%	-13.63%
1994		20,621	5,327	114,000	0.252650061	0.003196393	0.2628468370	0.333333333	0.666666667	25.27%	0.11%	17.52%	7.64%
1995		23,501	5,973	118,800	0.130729745	0.114461086	0.0412429585	0.333333333	0.666666667	13.07%	3.82%	2.75%	6.51%
1996		25,775	7,215	122,420	0.092330133	0.188912878	0.0300163485	0.333333333	0.666666667	9.23%	6.30%	2.00%	0.93%
1997		32,856	7,585	184,060	0.242742707	0.050010421	0.4078040360	0.333333333	0.666666667	24.27%	1.67%	27.19%	-4.58%
1998		34,489	6,793	196,903	0.048517137	-0.110279943	0.0674494303	0.333333333	0.666666667	4.85%	-3.68%	4.50%	4.03%
1999		38,159	7,740	202,320	0.101103332	0.130509017	0.0271393807	0.333333333	0.666666667	10.11%	4.35%	1.81%	3.95%
2000		49,982	8,810	213,400	0.269909487	0.129485752	0.0533177365	0.333333333	0.666666667	26.99%	4.32%	3.55%	19.12%
2001	MFG	50,514	10,653	246,910	0.01058756	0.189954103	0.1458555589	0.333333333	0.666666667	1.06%	6.33%	9.72%	-15.00%
2002		52,685	12,114	276,476	0.042088202	0.128547094	0.1131001202	0.333333333	0.666666667	4.21%	4.28%	7.54%	-7.62%
2003		55,998	13,745	299,064	0.060979024	0.126274478	0.0785335794	0.333333333	0.666666667	6.10%	4.21%	5.24%	-3.35%
2004		62,499	15,484	319,384	0.109833708	0.119134709	0.0657365433	0.333333333	0.666666667	10.98%	3.97%	4.38%	2.63%
2005		70,365	17,803	372,553	0.118551929	0.139569159	0.1539851690	0.333333333	0.666666667	11.86%	4.65%	10.27%	-3.06%
2006		78,775	21,167	404,565	0.112891892	0.173075754	0.0824331062	0.333333333	0.666666667	11.29%	5.77%	5.50%	0.02%
2007		85,490	22,415	422,674	0.081805174	0.057278683	0.0437887805	0.333333333	0.666666667	8.18%	1.91%	2.92%	3.35%
2008		99,641	32,201	533,849	0.153175664	0.362280226	0.2335118311	0.333333333	0.666666667	15.32%	12.08%	15.57%	-12.33%
2009		85,623	35,695	551,616	-0.15162449	0.103016002	0.0327391246	0.333333333	0.666666667	-15.16%	3.43%	2.18%	-20.78%
2010		94,546	40,336	553,052	0.099142163	0.122216767	0.0025998776	0.333333333	0.666666667	9.91%	4.07%	0.17%	5.67%
2011		111,772	41,010	579,941	0.16737019	0.01657339	0.0474744874	0.333333333	0.666666667	16.74%	0.55%	3.16%	13.02%
2012		121,816	45,140	594,415	0.086053087	0.095959874	0.0246507281	0.333333333	0.666666667	8.61%	3.20%	1.64%	3.76%
2013		117,531	46,461	600,191	-0.035811264	0.028853399	0.0096705028	0.333333333	0.666666667	-3.58%	0.96%	0.64%	-5.19%
2014		125,549	50,192	603,245	0.065991833	0.077236026	0.0050755929	0.333333333	0.666666667	6.60%	2.57%	0.34%	3.69%

[Type here]

2015		134,069	52,797	609,223	0.065658691	0.050606527	0.0098606755	<b>0.333333333</b>	<b>0.666666667</b>	<b>6.57%</b>	<b>1.69%</b>	<b>0.66%</b>	<b>4.22%</b>
<b>AVERAGE</b>									(1990-2015)	<b>9.05%</b>	<b>3.45%</b>	<b>5.91%</b>	<b>-0.31%</b>
									(1990-2000)	<b>12.76%</b>	<b>2.67%</b>	<b>7.77%</b>	<b>2.32%</b>
									(2000-2010)	<b>8.25%</b>	<b>5.00%</b>	<b>6.09%</b>	<b>-2.85%</b>
									(2010-2015)	<b>7.47%</b>	<b>2.17%</b>	<b>1.10%</b>	<b>4.20%</b>

[Type here]

### 10. Industry approach; growth accounting calculations for electricity, gas and water industry.

Period		GDP	Capital (K)	Worker	$\Delta$ GDP/GDP	$\Delta$ K/K	$\Delta$ L/L	$\alpha$	1- $\alpha$	$\Delta$ Y/Y	$\alpha \cdot \Delta$ K/K	1- $\alpha(\Delta$ L/L)	TFP
1990		3,176	2,444	20,678				0.333333333	0.666666667				
1991		3,484	2,545	20,762	0.092684002	0.040494609	0.0040540596	0.333333333	0.666666667	9.27%	1.35%	0.27%	7.65%
1992		3,727	2,921	21,078	0.067312448	0.137795373	0.0151054497	0.333333333	0.666666667	6.73%	4.59%	1.01%	1.13%
1993		3,573	3,200	21,850	-0.042077977	0.091224786	0.0359710790	0.333333333	0.666666667	-4.21%	3.04%	2.40%	-9.65%
1994		3,884	5,420	22,292	0.083453835	0.526945006	0.0200269482	0.333333333	0.666666667	8.35%	17.56%	1.34%	-10.55%
1995		4,169	5,200	23,407	0.070851608	-0.04143719	0.0488072532	0.333333333	0.666666667	7.09%	-1.38%	3.25%	5.21%
1996		4,472	5,227	24,451	0.070209504	0.005178874	0.0436359920	0.333333333	0.666666667	7.02%	0.17%	2.91%	3.94%
1997		5,121	3,348	23,044	0.135512983	-0.445474347	-0.0592656830	0.333333333	0.666666667	13.55%	-14.85%	-3.95%	32.35%
1998		5,325	4,470	24,355	0.039036577	0.289025256	0.0553317354	0.333333333	0.666666667	3.90%	9.63%	3.69%	-9.42%
1999		5,698	3,764	28,370	0.067683558	-0.171906187	0.1525950816	0.333333333	0.666666667	6.77%	-5.73%	10.17%	2.33%
2000		5,955	4,250	29,850	0.044077559	0.121436761	0.0508525910	0.333333333	0.666666667	4.41%	4.05%	3.39%	-3.03%
2001	EGW	6,310	7,293	31,370	0.057880436	0.540006299	0.0496671824	0.333333333	0.666666667	5.79%	18.00%	3.31%	-15.52%
2002		6,917	7,762	26,591	0.09190411	0.062330727	-0.1652792095	0.333333333	0.666666667	9.19%	2.08%	-11.02%	18.13%
2003		8,703	8,829	28,359	0.229686718	0.128786159	0.0643716274	0.333333333	0.666666667	22.97%	4.29%	4.29%	14.38%
2004		10,129	10,058	28,848	0.151709883	0.130371109	0.0170962263	0.333333333	0.666666667	15.17%	4.35%	1.14%	9.69%
2005		12,612	11,575	34,807	0.219213586	0.140434324	0.1877778495	0.333333333	0.666666667	21.92%	4.68%	12.52%	4.72%
2006		15,096	12,795	37,751	0.179811487	0.100179108	0.0811934494	0.333333333	0.666666667	17.98%	3.34%	5.41%	9.23%
2007		17,396	18,070	43,563	0.141825413	0.345231322	0.1431962008	0.333333333	0.666666667	14.18%	11.51%	9.55%	-6.87%
2008		21,197	33,509	55,729	0.197614348	0.617568414	0.2462924915	0.333333333	0.666666667	19.76%	20.59%	16.42%	-17.24%
2009		24,093	28,272	57,494	0.128071524	-0.169965231	0.0311799368	0.333333333	0.666666667	12.81%	-5.67%	2.08%	16.39%
2010		25,706	22,736	57,554	0.064779517	-0.217898487	0.0010430430	0.333333333	0.666666667	6.48%	-7.26%	0.07%	13.67%
2011		8,096	22,577	60,352	-1.155300669	-0.007035631	0.0474744874	0.333333333	0.666666667	-115.53%	-0.23%	3.16%	-118.46%
2012		9,173	25,649	61,858	0.124849528	0.127562254	0.0246507281	0.333333333	0.666666667	12.48%	4.25%	1.64%	6.59%
2013		10,113	24,107	62,460	0.097588157	-0.061990714	0.0096705028	0.333333333	0.666666667	9.76%	-2.07%	0.64%	11.18%
2014		11,067	26,460	62,777	0.090069134	0.093142525	0.0050755929	0.333333333	0.666666667	9.01%	3.10%	0.34%	5.56%

[Type here]

2015		12,189	27,834	63,399	0.096618817	0.050606527	0.0098606755	<b>0.333333333</b>	<b>0.666666667</b>	<b>9.66%</b>	<b>1.69%</b>	<b>0.66%</b>	<b>7.32%</b>
<b>AVERAGE</b>									<b>(1990-2015)</b>	<b>5.38%</b>	<b>3.24%</b>	<b>2.99%</b>	<b>-0.85%</b>
									<b>(1990-2000)</b>	<b>6.29%</b>	<b>1.84%</b>	<b>2.45%</b>	<b>2.00%</b>
									<b>(2000-2010)</b>	<b>13.70%</b>	<b>5.45%</b>	<b>4.29%</b>	<b>3.96%</b>
									<b>(2010-2015)</b>	<b>-11.36%</b>	<b>-0.09%</b>	<b>1.09%</b>	<b>-12.36%</b>

[Type here]

### 11. Industry approach; growth accounting calculations for construction industry.

Period		GDP	Capital (K)	Worker	$\Delta$ GDP/GDP	$\Delta$ K/K	$\Delta$ L/L	$\alpha$	1- $\alpha$	$\Delta$ Y/Y	$\alpha \cdot \Delta$ K/K	1- $\alpha(\Delta$ L/L)	TFP
1990		20,150	871	119,230				0.333333333	0.666666667				
1991		21,560	965	126,245	0.067649965	0.102486124	0.0571700626	0.333333333	0.666666667	6.76%	3.42%	3.81%	-0.46%
1992		23,058	1,200	130,350	0.067158097	0.217948734	0.0319986770	0.333333333	0.666666667	6.72%	7.26%	2.13%	-2.68%
1993		25,377	1,910	140,100	0.095843109	0.464781685	0.0721333130	0.333333333	0.666666667	9.58%	15.49%	4.81%	-10.72%
1994		25,816	2,046	143,250	0.017147224	0.068783425	0.0222349023	0.333333333	0.666666667	1.71%	2.29%	1.48%	-2.06%
1995		28,319	2,215	154,300	0.092515499	0.079365736	0.0743074038	0.333333333	0.666666667	9.25%	2.65%	4.95%	1.65%
1996		30,143	2,400	161,110	0.062429092	0.080216334	0.0431886021	0.333333333	0.666666667	6.24%	2.67%	2.88%	0.69%
1997		32,475	2,600	251,600	0.074512082	0.080042708	0.4457531633	0.333333333	0.666666667	7.45%	2.67%	29.72%	-24.93%
1998		34,097	2,725	257,300	0.048753562	0.046956983	0.0224021945	0.333333333	0.666666667	4.88%	1.57%	1.49%	1.82%
1999		34,573	2,870	260,000	0.013873545	0.051843602	0.0104389117	0.333333333	0.666666667	1.39%	1.73%	0.70%	-1.04%
2000		35,064	3,050	267,300	0.014099045	0.060829561	0.0276899921	0.333333333	0.666666667	1.41%	2.03%	1.85%	-2.46%
2001	CN	36,289	4,015	305,477	0.034344395	0.274895757	0.1335028662	0.333333333	0.666666667	3.43%	9.16%	8.90%	-14.63%
2002		37,744	4,424	420,896	0.039292751	0.097006917	0.3205112829	0.333333333	0.666666667	3.93%	3.23%	21.37%	-20.67%
2003		44,088	4,796	473,577	0.155358018	0.080737973	0.1179287459	0.333333333	0.666666667	15.54%	2.69%	7.86%	4.98%
2004		49,014	5,047	497,974	0.105928238	0.05101177	0.0502333486	0.333333333	0.666666667	10.59%	1.70%	3.35%	5.54%
2005		57,912	6,491	549,798	0.166818011	0.251622595	0.0990030712	0.333333333	0.666666667	16.68%	8.39%	6.60%	1.69%
2006		72,409	8,042	627,212	0.223400594	0.214287978	0.1317336635	0.333333333	0.666666667	22.34%	7.14%	8.78%	6.41%
2007		94,714	13,812	941,364	0.268536746	0.540838399	0.4060452858	0.333333333	0.666666667	26.85%	18.03%	27.07%	-18.24%
2008		122,242	17,223	1,223,609	0.255144906	0.220690344	0.2622300803	0.333333333	0.666666667	25.51%	7.36%	17.48%	0.68%
2009		120,650	11,438	1,139,696	-0.013114892	-0.409334609	-0.0710431284	0.333333333	0.666666667	-1.31%	-13.64%	-4.74%	17.07%
2010		122,752	13,718	1,140,041	0.017274634	0.181774686	0.0003026665	0.333333333	0.666666667	1.73%	6.06%	0.02%	-4.35%
2011		122,204	11,522	1,195,469	-0.00447428	-0.174446892	0.0474744874	0.333333333	0.666666667	-0.45%	-5.81%	3.16%	2.20%
2012		120,445	12,325	1,225,305	-0.014498562	0.067391855	0.0246507281	0.333333333	0.666666667	-1.45%	2.25%	1.64%	-5.34%
2013		125,506	13,538	1,237,211	0.041158451	0.093902366	0.0096705028	0.333333333	0.666666667	4.12%	3.13%	0.64%	0.34%
2014		138,674	14,860	1,243,507	0.099773832	0.093142525	0.0050755929	0.333333333	0.666666667	9.98%	3.10%	0.34%	6.53%

[Type here]

2015		147,415	15,631	1,255,829	0.06112705	0.050606527	0.0098606755	<b>0.333333333</b>	<b>0.666666667</b>	<b>6.11%</b>	<b>1.69%</b>	<b>0.66%</b>	<b>3.77%</b>
<b>AVERAGE</b>									(1990-2015)	<b>7.96%</b>	<b>3.85%</b>	<b>6.28%</b>	<b>-2.17%</b>
									(1990-2000)	<b>5.54%</b>	<b>4.18%</b>	<b>5.38%</b>	<b>-4.02%</b>
									(2000-2010)	<b>11.52%</b>	<b>4.74%</b>	<b>8.96%</b>	<b>-2.18%</b>
									(2010-2015)	<b>3.34%</b>	<b>1.74%</b>	<b>1.08%</b>	<b>0.53%</b>

[Type here]

## 12. Industry approach; growth accounting calculations for wholesale retail trade and repairing services industry.

Period		GDP	Capital (K)	Worker	$\Delta$ GDP/GDP	$\Delta$ K/K	$\Delta$ L/L	$\alpha$	1- $\alpha$	$\Delta$ Y/Y	$\alpha \cdot \Delta$ K/K	1- $\alpha(\Delta$ L/L)	TFP
1990		31,546	1,467	101,370				0.333333333	0.666666667				
1991		33,733	2,247	104,817	0.067027214	0.426376494	0.0334387831	0.333333333	0.666666667	6.70%	14.21%	2.23%	-9.74%
1992		37,580	2,416	109,210	0.107997618	0.072517287	0.0410566617	0.333333333	0.666666667	10.80%	2.42%	2.74%	5.65%
1993		40,767	2,620	159,555	0.081404697	0.081061038	0.3791160562	0.333333333	0.666666667	8.14%	2.70%	25.27%	-19.84%
1994		44,902	1,413	183,075	0.096589585	-0.617459214	0.1375072146	0.333333333	0.666666667	9.66%	-20.58%	9.17%	21.07%
1995		47,609	1,498	197,570	0.05855612	0.058415781	0.0761970470	0.333333333	0.666666667	5.86%	1.95%	5.08%	-1.17%
1996		53,868	1,559	202,620	0.123512763	0.039913705	0.0252393517	0.333333333	0.666666667	12.35%	1.33%	1.68%	9.34%
1997		59,168	1,900	226,562	0.093845813	0.197809296	0.1116863345	0.333333333	0.666666667	9.38%	6.59%	7.45%	-4.65%
1998		62,012	2,038	236,292	0.046945053	0.070115049	0.0420496902	0.333333333	0.666666667	4.69%	2.34%	2.80%	-0.45%
1999		63,729	2,267	311,604	0.027302237	0.106488437	0.2766648225	0.333333333	0.666666667	2.73%	3.55%	18.44%	-19.26%
2000		65,898	2,405	320,520	0.033471152	0.059092532	0.0282115260	0.333333333	0.666666667	3.35%	1.97%	1.88%	-0.50%
2001	WRTRS	67,585	2,817	370,827	0.025275145	0.158122585	0.1457909697	0.333333333	0.666666667	2.53%	5.27%	9.72%	-12.46%
2002		73,215	3,193	415,974	0.080023735	0.125319743	0.1148871117	0.333333333	0.666666667	8.00%	4.18%	7.66%	-3.83%
2003		78,797	3,779	450,208	0.073471645	0.168467193	0.0790869399	0.333333333	0.666666667	7.35%	5.62%	5.27%	-3.54%
2004		83,738	4,003	478,716	0.060820969	0.057489722	0.0613978215	0.333333333	0.666666667	6.08%	1.92%	4.09%	0.07%
2005		90,108	11,204	586,226	0.07331099	1.029321711	0.2025978611	0.333333333	0.666666667	7.33%	34.31%	13.51%	-40.49%
2006		107,263	13,275	640,280	0.17427392	0.169590284	0.0882001999	0.333333333	0.666666667	17.43%	5.65%	5.88%	5.89%
2007		132,166	23,228	724,010	0.208776429	0.559488309	0.1228996238	0.333333333	0.666666667	20.88%	18.65%	8.19%	-5.97%
2008		147,590	14,177	923,960	0.110377979	-0.493720142	0.2438635762	0.333333333	0.666666667	11.04%	-16.46%	16.26%	11.24%
2009		123,849	10,396	953,217	-0.175373339	-0.310183194	0.0311737991	0.333333333	0.666666667	-17.54%	-10.34%	2.08%	-9.28%
2010		131,954	12,340	954,220	0.063387324	0.171374678	0.0010516731	0.333333333	0.666666667	6.34%	5.71%	0.07%	0.56%
2011		135,984	12,695	1,000,614	0.030086826	0.028419879	0.0474744874	0.333333333	0.666666667	3.01%	0.95%	3.16%	-1.10%
2012		143,719	14,930	1,025,586	0.055323233	0.162109134	0.0246507281	0.333333333	0.666666667	5.53%	5.40%	1.64%	-1.51%
2013		158,411	15,806	1,035,552	0.097334083	0.057020721	0.0096705028	0.333333333	0.666666667	9.73%	1.90%	0.64%	7.19%
2014		163,800	16,446	1,040,821	0.033453378	0.039726334	0.0050755929	0.333333333	0.666666667	3.35%	1.32%	0.34%	1.68%

[Type here]

2015		174,316	17,300	1,051,135	0.062220218	0.050606527	0.0098606755	<b>0.333333333</b>	<b>0.666666667</b>	<b>6.22%</b>	<b>1.69%</b>	<b>0.66%</b>	<b>3.88%</b>
<b>AVERAGE</b>									<b>(1990-2015)</b>	<b>6.84%</b>	<b>3.29%</b>	<b>6.24%</b>	<b>-2.69%</b>
									<b>(1990-2000)</b>	<b>7.37%</b>	<b>1.65%</b>	<b>7.67%</b>	<b>-1.96%</b>
									<b>(2000-2010)</b>	<b>6.62%</b>	<b>5.13%</b>	<b>6.78%</b>	<b>-5.30%</b>
									<b>(2010-2015)</b>	<b>5.70%</b>	<b>2.83%</b>	<b>1.09%</b>	<b>1.78%</b>

[Type here]

### 13. Industry approach; growth accounting calculations for restaurants and hotels industry.

Period		GDP	Capital (K)	Worker	$\Delta$ GDP/GDP	$\Delta$ K/K	$\Delta$ L/L	$\alpha$	1- $\alpha$	$\Delta$ Y/Y	$\alpha \cdot \Delta$ K/K	1- $\alpha(\Delta$ L/L)	TFP
1990		2,756	0	0				0.333333333	0.666666667				
1991		2,852	0	0	0.034562033	#NUM!	#NUM!	0.333333333	0.666666667	3.46%	#NUM!	#NUM!	#NUM!
1992		3,157	0	0	0.10152364	#NUM!	#NUM!	0.333333333	0.666666667	10.15%	#NUM!	#NUM!	#NUM!
1993		3,448	0	0	0.088080374	#NUM!	#NUM!	0.333333333	0.666666667	8.81%	#NUM!	#NUM!	#NUM!
1994		3,696	1,628	33,220	0.069571822	#NUM!	#NUM!	0.333333333	0.666666667	6.96%	#NUM!	#NUM!	#NUM!
1995		3,890	1,826	36,720	0.051102618	0.114775515	0.1001694616	0.333333333	0.666666667	5.11%	3.83%	6.68%	-5.39%
1996		5,108	1,972	38,810	0.272278722	0.076920474	0.0553563796	0.333333333	0.666666667	27.23%	2.56%	3.69%	20.97%
1997		6,288	2,231	56,687	0.207919595	0.123401659	0.3788669622	0.333333333	0.666666667	20.79%	4.11%	25.26%	-8.58%
1998		7,135	2,281	63,445	0.126431437	0.022164028	0.1126284813	0.333333333	0.666666667	12.64%	0.74%	7.51%	4.40%
1999		8,316	2,450	70,305	0.153091918	0.071474081	0.1026695312	0.333333333	0.666666667	15.31%	2.38%	6.84%	6.08%
2000		8,855	2,532	72,008	0.06281564	0.03292148	0.0239343039	0.333333333	0.666666667	6.28%	1.10%	1.60%	3.59%
2001	RH	9,576	2,734	84,001	0.078235081	0.076756234	0.1540514796	0.333333333	0.666666667	7.82%	2.56%	10.27%	-5.01%
2002		10,469	3,461	94,930	0.089210445	0.235901731	0.1223110744	0.333333333	0.666666667	8.92%	7.86%	8.15%	-7.10%
2003		11,243	4,002	98,509	0.071295424	0.145160999	0.0370081367	0.333333333	0.666666667	7.13%	4.84%	2.47%	-0.18%
2004		11,908	4,770	109,931	0.057520149	0.175530792	0.1097049817	0.333333333	0.666666667	5.75%	5.85%	7.31%	-7.41%
2005		13,358	6,102	121,216	0.11488541	0.246257326	0.0977211819	0.333333333	0.666666667	11.49%	8.21%	6.51%	-3.23%
2006		15,830	6,865	131,707	0.169806513	0.117779024	0.0830056803	0.333333333	0.666666667	16.98%	3.93%	5.53%	7.52%
2007		17,939	7,972	159,032	0.125063025	0.149563413	0.1885256814	0.333333333	0.666666667	12.51%	4.99%	12.57%	-5.05%
2008		21,356	4,300	203,718	0.174340529	-0.617279137	0.2476312447	0.333333333	0.666666667	17.43%	-20.58%	16.51%	21.50%
2009		19,587	4,661	210,168	-0.086473556	0.080595347	0.0311705263	0.333333333	0.666666667	-8.65%	2.69%	2.08%	-13.41%
2010		21,566	4,097	210,389	0.096236559	-0.128926054	0.0010509872	0.333333333	0.666666667	9.62%	-4.30%	0.07%	13.85%
2011		25,047	5,390	220,618	0.149655245	0.274208364	0.0474744874	0.333333333	0.666666667	14.97%	9.14%	3.16%	2.66%
2012		27,316	6,004	226,124	0.086718551	0.107878654	0.0246507281	0.333333333	0.666666667	8.67%	3.60%	1.64%	3.43%
2013		31,449	6,522	228,321	0.140880584	0.082782917	0.0096705028	0.333333333	0.666666667	14.09%	2.76%	0.64%	10.68%
2014		34,204	7,159	229,483	0.08399457	0.093142525	0.0050755929	0.333333333	0.666666667	8.40%	3.10%	0.34%	4.96%

[Type here]

2015		35,619	7,531	231,757	0.04051916	0.050606527	0.0098606755	<b>0.333333333</b>	<b>0.666666667</b>	<b>4.05%</b>	<b>1.69%</b>	<b>0.66%</b>	<b>1.71%</b>
<b>AVERAGE</b>									<b>(1990-2015)</b>	<b>10.24%</b>	<b>#NUM!</b>	<b>#NUM!</b>	<b>#NUM!</b>
									<b>(1990-2000)</b>	<b>11.67%</b>	<b>#NUM!</b>	<b>#NUM!</b>	<b>#NUM!</b>
									<b>(2000-2010)</b>	<b>8.66%</b>	<b>1.56%</b>	<b>6.64%</b>	<b>0.46%</b>
									<b>(2010-2015)</b>	<b>9.97%</b>	<b>2.66%</b>	<b>1.09%</b>	<b>6.22%</b>

[Type here]

#### 14. Industry approach; growth accounting calculations for transport, storage and communication industry.

Period		GDP	Capital (K)	Worker	$\Delta$ GDP/GDP	$\Delta$ K/K	$\Delta$ L/L	$\alpha$	1- $\alpha$	$\Delta$ Y/Y	$\alpha \cdot \Delta$ K/K	1- $\alpha(\Delta$ L/L)	TFP
1990		9,139	3,756	72,047				0.333333333	0.666666667				
1991		9,874	4,114	75,223	0.077426058	0.09104123	0.0431383514	0.333333333	0.666666667	7.74%	3.03%	2.88%	1.83%
1992		10,687	5,194	77,217	0.079044995	0.233108322	0.0261626048	0.333333333	0.666666667	7.90%	7.77%	1.74%	-1.61%
1993		11,658	5,010	82,323	0.086976955	-0.036068198	0.0640308940	0.333333333	0.666666667	8.70%	-1.20%	4.27%	5.63%
1994		12,601	5,871	85,827	0.077797449	0.158589062	0.0416831083	0.333333333	0.666666667	7.78%	5.29%	2.78%	-0.29%
1995		15,504	6,882	93,615	0.207325502	0.15888433	0.0868569847	0.333333333	0.666666667	20.73%	5.30%	5.79%	9.65%
1996		16,456	7,229	94,906	0.059591313	0.049191407	0.0136963010	0.333333333	0.666666667	5.96%	1.64%	0.91%	3.41%
1997		17,615	8,806	97,473	0.068086404	0.197332593	0.0266884885	0.333333333	0.666666667	6.81%	6.58%	1.78%	-1.55%
1998		19,638	10,310	100,215	0.108721051	0.157680991	0.0277424615	0.333333333	0.666666667	10.87%	5.26%	1.85%	3.77%
1999		22,434	10,852	104,517	0.133091122	0.051235097	0.0420318596	0.333333333	0.666666667	13.31%	1.71%	2.80%	8.80%
2000		25,377	9,977	107,874	0.123255453	-0.084066951	0.0316141418	0.333333333	0.666666667	12.33%	-2.80%	2.11%	13.02%
2001	TSC	29,251	10,481	127,243	0.142075986	0.04928165	0.1651347647	0.333333333	0.666666667	14.21%	1.64%	11.01%	1.56%
2002		34,235	11,166	130,923	0.157341215	0.063309353	0.0285107200	0.333333333	0.666666667	15.73%	2.11%	1.90%	11.72%
2003		37,731	12,897	142,548	0.09722952	0.144121279	0.0850694210	0.333333333	0.666666667	9.72%	4.80%	5.67%	-0.75%
2004		46,344	13,152	147,807	0.205623614	0.019583834	0.0362285836	0.333333333	0.666666667	20.56%	0.65%	2.42%	17.49%
2005		52,196	15,262	184,766	0.118908407	0.148787519	0.2231827909	0.333333333	0.666666667	11.89%	4.96%	14.88%	-7.95%
2006		61,988	16,666	202,615	0.17193808	0.087992389	0.0922174670	0.333333333	0.666666667	17.19%	2.93%	6.15%	8.11%
2007		76,088	24,368	258,664	0.204946047	0.379908632	0.2442222956	0.333333333	0.666666667	20.49%	12.66%	16.28%	-8.45%
2008		88,815	32,374	333,912	0.154656653	0.284080575	0.2553475630	0.333333333	0.666666667	15.47%	9.47%	17.02%	-11.03%
2009		88,518	29,754	307,947	-0.003344161	-0.084387657	-0.0809497950	0.333333333	0.666666667	-0.33%	-2.81%	-5.40%	7.88%
2010		89,517	32,068	308,271	0.01121967	0.074886334	0.0010515760	0.333333333	0.666666667	1.12%	2.50%	0.07%	-1.44%
2011		100,764	40,328	323,259	0.118352349	0.229202435	0.0474744874	0.333333333	0.666666667	11.84%	7.64%	3.16%	1.03%
2012		107,123	43,986	331,327	0.061198409	0.086823696	0.0246507281	0.333333333	0.666666667	6.12%	2.89%	1.64%	1.58%
2013		111,498	44,610	334,546	0.040027819	0.014092141	0.0096705028	0.333333333	0.666666667	4.00%	0.47%	0.64%	2.89%
2014		121,137	54,453	336,249	0.082916248	0.19937624	0.0050755929	0.333333333	0.666666667	8.29%	6.65%	0.34%	1.31%

[Type here]

2015		131,697	57,280	339,581	0.083584093	0.050606527	0.0098606755	<b>0.333333333</b>	<b>0.666666667</b>	<b>8.36%</b>	<b>1.69%</b>	<b>0.66%</b>	<b>6.01%</b>	
<b>AVERAGE</b>										<b>(1990-2015)</b>	<b>10.67%</b>	<b>3.63%</b>	<b>4.13%</b>	<b>2.90%</b>
										<b>(1990-2000)</b>	<b>10.21%</b>	<b>3.26%</b>	<b>2.69%</b>	<b>4.27%</b>
										<b>(2000-2010)</b>	<b>12.58%</b>	<b>3.28%</b>	<b>6.56%</b>	<b>2.74%</b>
										<b>(2010-2015)</b>	<b>6.62%</b>	<b>3.64%</b>	<b>1.09%</b>	<b>1.90%</b>

[Type here]

### 15. Industry approach; growth accounting calculations for real estate and business services industry.

Period		GDP	Capital (K)	Worker	$\Delta$ GDP/GDP	$\Delta$ K/K	$\Delta$ L/L	$\alpha$	1- $\alpha$	$\Delta$ Y/Y	$\alpha \cdot \Delta$ K/K	1- $\alpha(\Delta$ L/L)	TFP
1990		11,752	986	3,100				0.333333333	0.666666667				
1991		12,746	1,100	3,325	0.081160849	0.109409104	0.0700675626	0.333333333	0.666666667	8.12%	3.65%	4.67%	-0.20%
1992		14,009	1,430	3,470	0.094523716	0.262364264	0.0426849199	0.333333333	0.666666667	9.45%	8.75%	2.85%	-2.14%
1993		16,309	2,475	24,220	0.152030826	0.548565952	1.9430241442	0.333333333	0.666666667	15.20%	18.29%	129.53%	-132.62%
1994		26,903	6,931	26,852	0.500513415	1.029763707	0.1031615680	0.333333333	0.666666667	50.05%	34.33%	6.88%	8.85%
1995		32,573	8,597	29,210	0.191246192	0.215409202	0.0841708103	0.333333333	0.666666667	19.12%	7.18%	5.61%	6.33%
1996		34,962	8,680	31,745	0.070756421	0.009608223	0.0832241162	0.333333333	0.666666667	7.08%	0.32%	5.55%	1.21%
1997		35,455	9,810	33,285	0.014014243	0.122380745	0.0473716124	0.333333333	0.666666667	1.40%	4.08%	3.16%	-5.84%
1998		36,620	9,617	34,900	0.032333254	-0.019869908	0.0473799842	0.333333333	0.666666667	3.23%	-0.66%	3.16%	0.74%
1999		38,113	10,478	35,925	0.039952051	0.085745455	0.0289466028	0.333333333	0.666666667	4.00%	2.86%	1.93%	-0.79%
2000		39,531	10,946	36,950	0.036530816	0.043696272	0.0281322154	0.333333333	0.666666667	3.65%	1.46%	1.88%	0.32%
2001	REBS	39,543	18,123	56,495	0.000314614	0.504225855	0.4245864913	0.333333333	0.666666667	0.03%	16.81%	28.31%	-45.08%
2002		45,549	18,188	63,664	0.141395088	0.00355395	0.1194671150	0.333333333	0.666666667	14.14%	0.12%	7.96%	6.06%
2003		52,422	19,008	67,107	0.140533472	0.0441233	0.0526691068	0.333333333	0.666666667	14.05%	1.47%	3.51%	9.07%
2004		62,802	19,518	73,817	0.180653189	0.026461404	0.0953006969	0.333333333	0.666666667	18.07%	0.88%	6.35%	10.83%
2005		71,171	23,441	87,694	0.125102402	0.183148023	0.1722644246	0.333333333	0.666666667	12.51%	6.10%	11.48%	-5.08%
2006		81,494	29,653	97,226	0.135448388	0.23506965	0.1031846834	0.333333333	0.666666667	13.54%	7.84%	6.88%	-1.17%
2007		111,180	64,693	148,241	0.310623831	0.780093814	0.4218011624	0.333333333	0.666666667	31.06%	26.00%	28.12%	-23.06%
2008		125,697	48,055	192,582	0.122723247	-0.297301205	0.2616827093	0.333333333	0.666666667	12.27%	-9.91%	17.45%	4.74%
2009		109,469	41,911	198,335	-0.138234372	-0.13679074	0.0294354832	0.333333333	0.666666667	-13.82%	-4.56%	1.96%	-11.23%
2010		112,621	43,190	198,202	0.028382336	0.03005294	-0.0006708075	0.333333333	0.666666667	2.84%	1.00%	-0.04%	1.88%
2011		121,123	43,063	207,838	0.072779881	-0.002948028	0.0474744874	0.333333333	0.666666667	7.28%	-0.10%	3.16%	4.21%
2012		132,791	45,751	213,026	0.091971008	0.060544964	0.0246507281	0.333333333	0.666666667	9.20%	2.02%	1.64%	5.54%
2013		149,814	50,771	215,096	0.120618806	0.104117303	0.0096705028	0.333333333	0.666666667	12.06%	3.47%	0.64%	7.95%
2014		164,591	51,717	216,190	0.094069704	0.01845241	0.0050755929	0.333333333	0.666666667	9.41%	0.62%	0.34%	8.45%

[Type here]

2015		180,467	54,401	218,332	0.092080992	0.050606527	0.0098606755	<b>0.333333333</b>	<b>0.666666667</b>	<b>9.21%</b>	<b>1.69%</b>	<b>0.66%</b>	<b>6.86%</b>
<b>AVERAGE</b>									<b>(1990-2015)</b>	<b>10.93%</b>	<b>5.35%</b>	<b>11.35%</b>	<b>-5.77%</b>
									<b>(1990-2000)</b>	<b>12.13%</b>	<b>8.02%</b>	<b>16.52%</b>	<b>-12.41%</b>
									<b>(2000-2010)</b>	<b>9.85%</b>	<b>4.29%</b>	<b>10.35%</b>	<b>-4.79%</b>
									<b>(2010-2015)</b>	<b>8.33%</b>	<b>1.45%</b>	<b>1.07%</b>	<b>5.82%</b>

[Type here]

**16. Industry approach; growth accounting calculations for social and personal services industry.**

Period		GDP	Capital (K)	Worker	$\Delta$ GDP/GDP	$\Delta$ K/K	$\Delta$ L/L	$\alpha$	1- $\alpha$	$\Delta$ Y/Y	$\alpha \cdot \Delta$ K/K	1- $\alpha(\Delta$ L/L)	TFP
1990		2,927	144	78,141				0.333333333	0.666666667				
1991		3,191	153	85,166	0.08616654	0.060624622	0.0860874061	0.333333333	0.666666667	8.62%	2.02%	5.74%	0.86%
1992		3,504	168	92,831	0.093652225	0.093526058	0.0861783426	0.333333333	0.666666667	9.37%	3.12%	5.75%	0.50%
1993		3,892	190	41,220	0.10502182	0.123060093	-0.8118570603	0.333333333	0.666666667	10.50%	4.10%	-54.12%	60.52%
1994		3,805	238	52,500	-0.022561653	0.225246602	0.2418895941	0.333333333	0.666666667	-2.26%	7.51%	16.13%	-25.89%
1995		4,043	281	55,920	0.060674011	0.166083996	0.0631089283	0.333333333	0.666666667	6.07%	5.54%	4.21%	-3.68%
1996		4,546	300	57,300	0.117300018	0.065427805	0.0243785258	0.333333333	0.666666667	11.73%	2.18%	1.63%	7.92%
1997		5,032	370	61,750	0.101487953	0.209720531	0.0747933518	0.333333333	0.666666667	10.15%	6.99%	4.99%	-1.83%
1998		5,281	394	65,510	0.048336547	0.062847904	0.0591088272	0.333333333	0.666666667	4.83%	2.09%	3.94%	-1.20%
1999		5,615	524	70,010	0.061300526	0.285140775	0.0664352862	0.333333333	0.666666667	6.13%	9.50%	4.43%	-7.80%
2000		6,108	590	74,560	0.08425747	0.118630853	0.0629660814	0.333333333	0.666666667	8.43%	3.95%	4.20%	0.27%
2001	SPS	7,493	1,642	90,511	0.204348784	1.023699995	0.1938672199	0.333333333	0.666666667	20.43%	34.12%	12.92%	-26.61%
2002		8,646	2,059	91,035	0.143116692	0.225984147	0.0057726577	0.333333333	0.666666667	14.31%	7.53%	0.38%	6.39%
2003		9,781	2,589	99,328	0.123300878	0.229036429	0.0871834572	0.333333333	0.666666667	12.33%	7.63%	5.81%	-1.12%
2004		11,163	3,020	106,700	0.132159459	0.154070984	0.0715936532	0.333333333	0.666666667	13.22%	5.14%	4.77%	3.31%
2005		12,147	3,391	123,137	0.084531344	0.115966605	0.1432763984	0.333333333	0.666666667	8.45%	3.87%	9.55%	-4.96%
2006		13,737	3,865	134,888	0.122958333	0.130906835	0.0911472478	0.333333333	0.666666667	12.30%	4.36%	6.08%	1.86%
2007		16,666	6,981	145,538	0.193293894	0.591120728	0.0759924164	0.333333333	0.666666667	19.33%	19.70%	5.07%	-5.44%
2008		20,859	8,097	183,804	0.224430065	0.148282287	0.2334327516	0.333333333	0.666666667	22.44%	4.94%	15.56%	1.94%
2009		21,916	5,814	189,969	0.049408222	-0.331126243	0.0329909285	0.333333333	0.666666667	4.94%	-11.04%	2.20%	13.78%
2010		23,586	8,567	190,511	0.073434845	0.387586652	0.0028490347	0.333333333	0.666666667	7.34%	12.92%	0.19%	-5.77%
2011		29,833	14,823	199,774	0.23497424	0.548313131	0.0474744874	0.333333333	0.666666667	23.50%	18.28%	3.16%	2.06%
2012		32,868	16,217	204,759	0.096866333	0.089858798	0.0246507281	0.333333333	0.666666667	9.69%	3.00%	1.64%	5.05%
2013		32,004	17,657	206,749	-0.026630338	0.085057107	0.0096705028	0.333333333	0.666666667	-2.66%	2.84%	0.64%	-6.14%
2014		34,608	18,380	207,801	0.078227473	0.0401654	0.0050755929	0.333333333	0.666666667	7.82%	1.34%	0.34%	6.15%

[Type here]

2015		37,776	19,335	209,860	0.087591789	0.050606527	0.0098606755	0.333333333	0.666666667	8.76%	1.69%	0.66%	6.41%	
<b>AVERAGE</b>										(1990-2015)	10.23%	6.53%	2.63%	1.06%
										(1990-2000)	7.36%	4.70%	-0.31%	2.97%
										(2000-2010)	13.05%	8.47%	6.07%	-1.49%
										(2010-2015)	9.07%	6.68%	1.11%	1.29%

[Type here]

**17. Industry approach; growth accounting calculations for financial corporation sector industry.**

Period		GDP	Capital (K)	Worker	$\Delta$ GDP/GDP	$\Delta$ K/K	$\Delta$ L/L	$\alpha$	1- $\alpha$	$\Delta$ Y/Y	$\alpha \cdot \Delta$ K/K	1- $\alpha(\Delta$ L/L)	TFP
1990		10,627	54	16,061				0.3333333333	0.6666666667				
1991		11,377	90	16,699	0.068238262	0.510825624	0.0389548643	0.3333333333	0.6666666667	6.82%	17.03%	2.60%	-12.80%
1992		11,618	93	16,862	0.020916738	0.032789823	0.0097137321	0.3333333333	0.6666666667	2.09%	1.09%	0.65%	0.35%
1993		13,739	105	16,933	0.167671585	0.121360857	0.0042018112	0.3333333333	0.6666666667	16.77%	4.05%	0.28%	12.44%
1994		9,103	114	16,858	-0.411618661	0.082238098	-0.0044390591	0.3333333333	0.6666666667	-41.16%	2.74%	-0.30%	-43.61%
1995		10,484	159	17,392	0.141256948	0.332705754	0.0311850088	0.3333333333	0.6666666667	14.13%	11.09%	2.08%	0.96%
1996		11,726	169	18,017	0.111981824	0.060994513	0.0353054263	0.3333333333	0.6666666667	11.20%	2.03%	2.35%	6.81%
1997		13,102	220	20,915	0.110890074	0.263728831	0.1491508483	0.3333333333	0.6666666667	11.09%	8.79%	9.94%	-7.65%
1998		15,452	236	22,527	0.165010841	0.070204259	0.0742479849	0.3333333333	0.6666666667	16.50%	2.34%	4.95%	9.21%
1999		16,211	279	22,878	0.047974424	0.167379977	0.0154611603	0.3333333333	0.6666666667	4.80%	5.58%	1.03%	-1.81%
2000		17,634	280	23,489	0.08411617	0.003577821	0.0263564764	0.3333333333	0.6666666667	8.41%	0.12%	1.76%	6.54%
2001	FCS	19,987	1,182	24,825	0.125246257	1.440351244	0.0553189835	0.3333333333	0.6666666667	12.52%	48.01%	3.69%	-39.18%
2002		22,041	1,306	25,724	0.097818154	0.099353727	0.0355731983	0.3333333333	0.6666666667	9.78%	3.31%	2.37%	4.10%
2003		24,929	1,480	26,368	0.123150447	0.125524389	0.0247267455	0.3333333333	0.6666666667	12.32%	4.18%	1.65%	6.48%
2004		29,791	1,768	27,011	0.178144788	0.177302434	0.0240930367	0.3333333333	0.6666666667	17.81%	5.91%	1.61%	10.30%
2005		42,196	1,938	35,791	0.348125846	0.092090395	0.2814522747	0.3333333333	0.6666666667	34.81%	3.07%	18.76%	12.98%
2006		51,091	2,182	41,673	0.191282176	0.118477002	0.1521569719	0.3333333333	0.6666666667	19.13%	3.95%	10.14%	5.04%
2007		67,872	5,596	54,595	0.284016556	0.941876273	0.2700888664	0.3333333333	0.6666666667	28.40%	31.40%	18.01%	-21.00%
2008		74,310	3,525	69,940	0.090622427	-0.462030144	0.2476954282	0.3333333333	0.6666666667	9.06%	-15.40%	16.51%	7.95%
2009		73,297	5,011	72,154	-0.013721287	0.351688745	0.0311649921	0.3333333333	0.6666666667	-1.37%	11.72%	2.08%	-15.17%
2010		74,017	7,472	72,232	0.009773694	0.399441507	0.0010804373	0.3333333333	0.6666666667	0.98%	13.31%	0.07%	-12.41%
2011		78,862	5,298	75,744	0.063402056	-0.343794569	0.0474744874	0.3333333333	0.6666666667	6.34%	-11.46%	3.16%	14.64%
2012		87,353	6,988	77,634	0.102260786	0.276896158	0.0246507281	0.3333333333	0.6666666667	10.23%	9.23%	1.64%	-0.65%
2013		108,327	7,865	78,389	0.215193871	0.118195949	0.0096705028	0.3333333333	0.6666666667	21.52%	3.94%	0.64%	16.93%
2014		122,418	8,633	78,788	0.122291327	0.093142525	0.0050755929	0.3333333333	0.6666666667	12.23%	3.10%	0.34%	8.79%

[Type here]

2015		132,766	9,081	79,568	0.081148586	0.050606527	0.0098606755	0.333333333	0.666666667	8.11%	1.69%	0.66%	5.77%	
<b>AVERAGE</b>										(1990-2015)	10.10%	6.83%	4.27%	-1.00%
										(1990-2000)	5.06%	5.49%	2.53%	-2.96%
										(2000-2010)	13.81%	9.96%	6.97%	-3.13%
										(2010-2015)	9.90%	3.30%	1.09%	5.51%

[Type here]

**18. Industry approach; growth accounting calculations for government services sector industry.**

Period		GDP	Capital (K)	Worker	$\Delta$ GDP/GDP	$\Delta$ K/K	$\Delta$ L/L	$\alpha$	1- $\alpha$	$\Delta$ Y/Y	$\alpha \cdot \Delta$ K/K	1- $\alpha(\Delta$ L/L)	TFP
1990		8,402	3,089	114,161				0.333333333	0.666666667				
1991		8,833	2,999	115,668	0.050081889	-0.029568514	0.0131142858	0.333333333	0.666666667	5.01%	-0.99%	0.87%	5.12%
1992		9,341	3,551	120,436	0.055910753	0.168950354	0.0403944729	0.333333333	0.666666667	5.59%	5.63%	2.69%	-2.73%
1993		10,099	4,120	129,248	0.078023961	0.148623909	0.0706145479	0.333333333	0.666666667	7.80%	4.95%	4.71%	-1.86%
1994		10,310	7,161	131,105	0.020697837	0.552796473	0.0142654895	0.333333333	0.666666667	2.07%	18.43%	0.95%	-17.31%
1995		10,825	4,232	135,522	0.048688422	-0.525974941	0.0331354599	0.333333333	0.666666667	4.87%	-17.53%	2.21%	20.19%
1996		11,431	4,289	140,087	0.054508136	0.013378911	0.0331296694	0.333333333	0.666666667	5.45%	0.45%	2.21%	2.80%
1997		11,963	5,334	146,872	0.045481266	0.21804782	0.0472978010	0.333333333	0.666666667	4.55%	7.27%	3.15%	-5.87%
1998		12,964	5,271	154,659	0.0803551	-0.011881328	0.0516612342	0.333333333	0.666666667	8.04%	-0.40%	3.44%	4.99%
1999		14,550	3,976	163,671	0.11541475	-0.281943809	0.0566356220	0.333333333	0.666666667	11.54%	-9.40%	3.78%	17.16%
2000		16,560	4,510	171,064	0.129420854	0.126020865	0.0441794401	0.333333333	0.666666667	12.94%	4.20%	2.95%	5.80%
2001	GSS	17,310	13,299	214,226	0.04430717	1.081408609	0.2249937770	0.333333333	0.666666667	4.43%	36.05%	15.00%	-46.62%
2002		18,410	13,593	237,368	0.061585136	0.021867069	0.1025801470	0.333333333	0.666666667	6.16%	0.73%	6.84%	-1.41%
2003		19,917	15,704	250,174	0.078693805	0.144358608	0.0525449963	0.333333333	0.666666667	7.87%	4.81%	3.50%	-0.45%
2004		20,881	16,015	264,568	0.047245891	0.019572638	0.0559416313	0.333333333	0.666666667	4.72%	0.65%	3.73%	0.34%
2005		23,131	15,164	286,435	0.10234694	-0.054579881	0.0794133272	0.333333333	0.666666667	10.23%	-1.82%	5.29%	6.76%
2006		24,516	17,874	329,567	0.058139051	0.164422945	0.1402680373	0.333333333	0.666666667	5.81%	5.48%	9.35%	-9.02%
2007		27,575	23,599	400,438	0.117577693	0.277857195	0.1947792764	0.333333333	0.666666667	11.76%	9.26%	12.99%	-10.49%
2008		39,576	41,953	512,145	0.361332552	0.575345606	0.2460488400	0.333333333	0.666666667	36.13%	19.18%	16.40%	0.55%
2009		45,444	57,276	528,362	0.138260743	0.311331744	0.0311738668	0.333333333	0.666666667	13.83%	10.38%	2.08%	1.37%
2010		57,151	39,230	528,918	0.229214584	-0.378427803	0.0010517555	0.333333333	0.666666667	22.92%	-12.61%	0.07%	35.47%
2011		60,204	42,238	554,634	0.052028803	0.07386246	0.0474744874	0.333333333	0.666666667	5.20%	2.46%	3.16%	-0.42%
2012		67,961	40,499	568,476	0.121202663	-0.042039063	0.0246507281	0.333333333	0.666666667	12.12%	-1.40%	1.64%	11.88%
2013		76,953	38,782	574,000	0.124257779	-0.04333318	0.0096705028	0.333333333	0.666666667	12.43%	-1.44%	0.64%	13.23%

[Type here]

2014		82,909	42,567	576,921	0.074549148	0.093142525	0.0050755929	<b>0.333333333</b>	<b>0.666666667</b>	7.45%	3.10%	0.34%	4.01%
2015		86,073	44,777	582,638	0.037450246	0.050606527	0.0098606755	<b>0.333333333</b>	<b>0.666666667</b>	3.75%	1.69%	0.66%	1.40%
<b>AVERAGE</b>									(1990-2015)	9.31%	3.57%	4.35%	1.40%
									(1990-2000)	6.79%	1.26%	2.70%	2.83%
									(2000-2010)	12.44%	6.94%	7.11%	-1.61%
									(2010-2015)	10.65%	-1.37%	1.09%	10.93%

[Type here]

### 19. Country approach; growth accounting calculations for the UAE.

Data for UAE	GDP (constant LCU)	Gross capital formation (constant LCU)	Population, total	Pop 15-64 Share of Total Population	Labour force participation rate, total (% of total pop 15-64)	Years of education per worker	Human Capital Adjusted Labour Input	TFP	<u>Growth Rate of</u>					
									Y	K	L	D	P	S
2001	652,734,000,000	100,944,000,000	3,217,865	0.75	0.58	2.63	3,679,559	8,269.04						
2002	668,618,000,000	106,803,000,000	3,394,060	0.77	0.59	2.65	4,081,020	7,745.78	0.024	-0.065	0.056	0.104		
2003	727,460,000,000	114,868,000,000	3,625,798	0.78	0.61	2.66	4,597,294	7,585.74	0.084	-0.021	0.073	0.119		
2004	797,052,000,000	117,864,000,000	3,975,945	0.80	0.62	2.68	5,291,320	7,474.42	0.091	-0.015	0.026	0.141		
2005	835,750,000,000	135,636,000,000	4,481,976	0.81	0.63	2.70	6,178,810	6,741.10	0.047	-0.103	0.140	0.155		
2006	917,965,400,000	155,826,000,000	5,171,255	0.82	0.64	2.70	7,340,224	6,295.61	0.094	-0.068	0.139	0.172		

[Type here]

		223,283,000,00											
2007	947,197,000,000	0	6,010,100	0.84	0.65	2.71	8,885,946	5,101.42	0.031	-0.210	0.360	0.191	
		224,106,000,00					10,494,45						
2008	977,429,977,400	0	6,900,142	0.85	0.66	2.71	9	4,680.34	0.031	-0.086	0.004	0.166	
		244,399,000,00					11,910,75						
2009	926,184,087,000	0	7,705,423	0.85	0.67	2.71	1	3,954.67	-0.054	-0.168	0.087	0.127	
		221,011,000,00					13,236,78						
2010	941,331,355,900	0	8,329,453	0.86	0.68	2.72	9	3,847.43	0.016	-0.027	-0.101	0.106	
		225,002,000,00					13,897,22						
2011	990,354,000,000	0	8,734,722	0.86	0.68	2.72	4	3,891.21	0.051	0.011	0.018	0.049	
	1,057,625,000,00	254,720,000,00					14,470,36						
2012	0	0	8,952,542	0.86	0.69	2.72	0	3,892.04	0.066	0.000	0.124	0.040	
	1,107,639,000,00	283,905,000,00					14,458,91						
2013	0	0	9,039,978	0.85	0.69	2.73	3	3,947.77	0.046	0.014	0.108	-0.001	
	1,141,753,000,00	307,517,000,00					14,550,01						
2014	0	0	9,086,139	0.85	0.69	2.73	6	3,955.55	0.030	0.002	0.080	0.006	
<b>Growth 2001-</b>									-	<b>0.61</b>	-	-	
<b>2014</b>	<b>4.04%</b>	<b>8.95%</b>	<b>9.31%</b>	<b>0.99%</b>	<b>1.38%</b>	<b>0.25%</b>	<b>11.93%</b>	<b>-7.00%</b>	<b>0.27%</b>	<b>%</b>	<b>0.22%</b>	<b>1.15%</b>	

[Type here]

Constant returns to scale= 1,      alpha=0.3,      (1-a)=0.7

		Labour Productivity															
		$\Delta\text{GDP}/\text{GDP}$	$\Delta\text{K}/\text{K}$	$\Delta\text{p}/\text{p}$	$\Delta\text{P}/\text{P}$	$\Delta\text{a}/\text{a}$	$\Delta\text{u}$	$\Delta\text{y}/\text{y}$	$\Delta\text{k}/\text{k}$	$\Delta\text{A}/\text{A}$	$\alpha\cdot\Delta\text{k}/\text{k}$	$(1-\alpha)\cdot\Delta\text{P}/\text{P}$	$(1-\alpha)\cdot\Delta\text{p}/\text{p}$	$(1-\alpha)\cdot\Delta\text{a}/\text{a}$	minus $(1-\alpha)\cdot\Delta\text{u}$	$\alpha(\text{K})$	$1-\alpha(\text{L})$
2001-2014	UAE	0.41%	-0.30%	0.09%	-0.90%	-0.26%	0.04%	<b>0.41%</b>	0.59%	<b>0.89%</b>	<b>0.20%</b>	<b>-0.60%</b>	<b>0.06%</b>	<b>-0.17%</b>	<b>0.03%</b>	33.33%	66.67%
2001-2005	UAE	<b>-1.45%</b>	<b>3.19%</b>	<b>0.10%</b>	<b>5.72%</b>	<b>0.25%</b>	<b>0.00%</b>	<b>-1.45%</b>	-2.54%	<b>-4.65%</b>	<b>-0.85%</b>	<b>3.82%</b>	<b>0.07%</b>	<b>0.16%</b>	<b>0.00%</b>	33.33%	<b>66.67%</b>
2005-2010	UAE	-0.70%	-5.68%	0.14%	-2.57%	-0.44%	0.31%	<b>-0.70%</b>	-3.10%	<b>2.04%</b>	<b>-1.03%</b>	<b>-1.72%</b>	<b>0.09%</b>	<b>-0.29%</b>	<b>0.21%</b>	33.33%	66.67%
2010-2014	UAE	2.05%	4.54%	0.01%	-1.91%	-0.19%	-0.43%	<b>2.05%</b>	6.45%	<b>1.58%</b>	<b>2.15%</b>	<b>-1.27%</b>	<b>0.01%</b>	<b>-0.13%</b>	<b>-0.29%</b>	33.33%	<b>66.67%</b>

[Type here]

## 20. Country approach; growth accounting calculations for the SAU.

Data for SAU	GDP (constant LCU)	Gross capital formation (constant LCU)	Population, total	Pop 15-64 Share of Total Population	Labour force participation rate, total (% of total pop 15-64)	Years of education per worker	Human Capital Adjusted Labour Input	TFP	<u>Growth Rate of</u>				
									Y	K	L	D	P
2001	1,208,272,000,000	34,557,866,667	22,007,937	0.60	0.31	2.26	9,206,672	11,110.38					
2002	1,209,815,000,000	37,095,733,333	22,668,102	0.61	0.31	2.29	9,927,934	10,330.48	0.001	-0.073	0.071	0.075	
2003	1,302,478,000,000	42,526,133,333	23,357,887	0.62	0.32	2.31	10,787,483	10,072.32	0.074	-0.025	0.137	0.083	
2004	1,423,012,000,000	51,398,133,333	24,055,573	0.63	0.33	2.34	11,699,095	9,822.40	0.089	-0.025	0.189	0.081	
2005	1,526,266,000,000	66,266,179,179	24,745,230	0.64	0.34	2.37	12,589,178	9,273.52	0.070	-0.058	0.254	0.073	
2006	1,611,382,000,000	83,728,971,963	25,419,994	0.65	0.34	2.40	13,519,959	8,682.66	0.054	-0.066	0.234	0.071	
2007	1,707,941,000,000	110,117,678,452	26,083,522	0.65	0.35	2.42	14,383,910	8,117.12	0.058	-0.067	0.274	0.062	
2008	1,851,872,000,000	141,882,666,667	26,742,842	0.66	0.35	2.45	15,171,017	7,858.18	0.081	-0.032	0.253	0.053	
2009	1,885,746,000,000	136,089,600,000	27,409,491	0.66	0.35	2.48	15,922,870	7,832.87	0.018	-0.003	-0.042	0.048	
2010	1,975,543,000,000	161,959,200,000	28,090,647	0.67	0.36	2.51	16,847,732	7,486.62	0.047	-0.045	0.174	0.056	

[Type here]

2011	2,172,286,000,000	179,306,666,667	28,788,438	0.67	0.36	2.53	17,809,158	7,680.47	0.095	0.026	0.102	0.055
2012	2,289,252,000,000	193,320,000,000	29,496,047	0.68	0.37	2.56	18,834,465	7,609.27	0.052	-0.009	0.075	0.056
2013	2,350,373,000,000	195,324,000,000	30,201,051	0.68	0.39	2.58	20,667,791	7,298.01	0.026	-0.042	0.010	0.093
2014	2,435,896,000,000	214,936,533,333	30,886,545	0.68	0.39	2.60	21,599,797	7,126.08	0.036	-0.024	0.096	0.044
<b>Growth 2001-2014</b>									-	<b>0.35</b>	-	-
	<b>5.78%</b>	<b>15.51%</b>	<b>2.59%</b>	<b>0.95%</b>	<b>1.75%</b>	<b>1.10%</b>	<b>6.40%</b>	<b>-3.35%</b>	<b>0.09%</b>	<b>%</b>	<b>1.01%</b>	<b>0.18%</b>
<b>Constant returns to scale= 1, alpha=0.3, (1-a)=0.7</b>												

<b>Labour Productivity</b>																	
		$\Delta\text{GDP}/\text{GDP}$	$\Delta\text{K}/\text{K}$	$\Delta\text{p}/\text{p}$	$\Delta\text{P}/\text{P}$	$\Delta\text{a}/\text{a}$	$\Delta\text{u}$	$\Delta\text{y}/\text{y}$	$\Delta\text{k}/\text{k}$	$\Delta\text{A}/\text{A}$	$\alpha\cdot\Delta\text{k}/\text{k}$	$(1-\alpha)\cdot\Delta\text{P}/\text{P}$	$(1-\alpha)\cdot\Delta\text{p}/\text{p}$	$(1-\alpha)\cdot\Delta\text{a}/\text{a}$	minus $(1-\alpha)\cdot\Delta\text{u}$	$\alpha(\text{K})$	$1-\alpha(\text{L})$
2001-2014	SAU	-0.13%	-1.59%	0.08%	-0.11%	-0.11%	0.04%	<b>-0.13%</b>	-1.48%	<b>0.43%</b>	<b>-0.49%</b>	<b>-0.08%</b>	<b>0.05%</b>	<b>-0.07%</b>	<b>0.03%</b>	33.33%	66.67%
2001-2005	SAU	<b>4.18%</b>	<b>15.17%</b>	<b>0.05%</b>	<b>0.88%</b>	<b>0.35%</b>	<b>0.00%</b>	<b>4.18%</b>	14.29%	<b>-1.44%</b>	<b>4.76%</b>	<b>0.58%</b>	<b>0.03%</b>	<b>0.24%</b>	<b>0.00%</b>	33.33%	<b>66.67%</b>
2005-2010	SAU	-1.42%	-7.94%	-0.12%	-0.52%	-0.31%	0.31%	<b>-1.42%</b>	-7.43%	<b>1.48%</b>	<b>-2.48%</b>	<b>-0.34%</b>	<b>-0.08%</b>	<b>-0.21%</b>	<b>0.21%</b>	33.33%	66.67%
2010-2014	SAU	-0.88%	-2.76%	0.43%	-0.05%	-0.07%	-0.43%	<b>-0.88%</b>	-2.71%	<b>0.11%</b>	<b>-0.90%</b>	<b>-0.03%</b>	<b>0.29%</b>	<b>-0.05%</b>	<b>-0.29%</b>	33.33%	<b>66.67%</b>

[Type here]

## 21. Country approach; growth accounting calculations for the BHR.

Data for BHR	GDP (constant LCU)	Gross capital formation (constant LCU)	Population , total	Pop 15-64 Share of Total Populatio n	Labour force participatio n rate, total (% of total pop 15-64)	Years of educatio n per worker	Human Capital Adjusted Labour Input	TFP	<u>Growth Rate of</u>			
									gY	gA	gK	gH
	Y	K	L	D	P	S	H	A	gY	gA	gK	gH
2001	5,879,260,700	1,410,118,351	694,893	0.68	0.46	2.33	511,130	1,068.01				
2002	6,091,745,900	2,239,872,340	725,365	0.69	0.47	2.32	542,526	923.81	0.036	-0.145	0.463	0.060
2003	6,458,709,700	2,628,704,521	761,595	0.70	0.47	2.31	576,397	894.78	0.058	-0.032	0.160	0.061
2004	6,909,588,800	2,698,415,957	807,989	0.70	0.47	2.30	618,014	904.53	0.067	0.011	0.026	0.070
2005	7,377,294,700	4,269,286,968	867,014	0.71	0.48	2.28	679,215	787.74	0.065	-0.138	0.459	0.094
2006	7,854,500,000	5,623,218,085	940,808	0.73	0.50	2.28	790,113	694.61	0.063	-0.126	0.275	0.151
2007	8,505,830,000	7,543,191,489	1,026,568	0.75	0.52	2.28	916,933	620.60	0.080	-0.113	0.294	0.149
2008	9,037,030,000	9,042,819,149	1,115,777	0.76	0.54	2.27	1,047,558	568.87	0.061	-0.087	0.181	0.133
2009	9,266,550,000	5,996,808,511	1,196,774	0.77	0.56	2.27	1,168,611	611.19	0.025	0.072	-0.411	0.109

[Type here]

2010	9,668,200,000	7,016,223,404	1,261,319	0.78	0.57	2.26	1,265,321	575.41	0.042	-0.060	0.157	0.080	
2011	9,859,960,000	4,745,159,574	1,306,014	0.78	0.56	2.26	1,295,392	649.11	0.020	0.121	-0.391	0.023	
2012	10,227,550,000	6,188,058,511	1,333,577	0.77	0.56	2.26	1,304,772	618.63	0.037	-0.048	0.265	0.007	
2013	10,781,560,000	5,566,143,617	1,349,427	0.77	0.56	2.25	1,298,110	675.61	0.053	0.088	-0.106	-0.005	
2014	11,250,610,000	5,519,574,468	1,361,930	0.76	0.55	2.25	1,289,040	710.26	0.043	0.050	-0.008	-0.007	
<b>Growth 2001-2014</b>										-	<b>1.44</b>	-	-
	<b>5.11%</b>	<b>9.29%</b>	<b>5.86%</b>	<b>1.10%</b>	<b>1.77%</b>	<b>-0.25%</b>	<b>8.48%</b>	<b>-3.61%</b>	<b>0.19%</b>	<b>%</b>	<b>3.68%</b>	<b>0.75%</b>	
<b>Constant returns to scale= 1, alpha=0.3, (1-a)=0.7</b>													

<b>Labour Productivity</b>																	
		$\Delta$ GDP/GDP	$\Delta$ K/K	$\Delta$ p/p	$\Delta$ P/P	$\Delta$ a/a	$\Delta$ u	$\Delta$ y/y	$\Delta$ k/k	$\Delta$ A/A	$\alpha \cdot \Delta$ k/k	$(1-\alpha) \cdot \Delta$ P/P	$(1-\alpha) \cdot \Delta$ p/p	$(1-\alpha) \cdot \Delta$ a/a	minus $(1-\alpha) \cdot \Delta$ u	$\alpha(K)$	$1-\alpha(L)$
2001-2014	BHN	0.002	-0.042	0.000	-0.005	-0.002	0.000	<b>0.002</b>	-0.037	<b>0.019</b>	<b>-0.012</b>	<b>-0.003</b>	<b>0.000</b>	<b>-0.001</b>	<b>0.000</b>	0.333	0.667
2001-2005	BHN	<b>0.003</b>	<b>-0.004</b>	<b>0.006</b>	<b>0.029</b>	<b>0.001</b>	<b>0.000</b>	<b>0.003</b>	-0.033	<b>-0.010</b>	<b>-0.011</b>	<b>0.020</b>	<b>0.004</b>	<b>0.000</b>	<b>0.000</b>	0.333	<b>0.667</b>
2005-2010	BHN	-0.004	-0.125	-0.002	-0.013	-0.002	0.003	<b>-0.004</b>	-0.112	<b>0.042</b>	<b>-0.037</b>	<b>-0.009</b>	<b>-0.001</b>	<b>-0.001</b>	<b>0.002</b>	0.333	0.667
2010-2014	BHN	0.014	-0.013	-0.002	-0.011	-0.003	-0.004	<b>0.014</b>	-0.002	<b>0.029</b>	<b>-0.001</b>	<b>-0.008</b>	<b>-0.002</b>	<b>-0.002</b>	<b>-0.003</b>	0.333	<b>0.667</b>

[Type here]

## 22. Country approach; growth accounting calculations for the QTR.

Data for QTR	GDP (constant LCU)	Gross capital formation (constant LCU)	Population, total	Pop 15-64 Share of Total Population	Labour force participation rate, total (% of total pop 15-64)	Years of education per worker	Human Capital Adjusted Labour Input	TFP	<u>Growth Rate of</u>			
									gY	gA	gK	gH
	Y	K	L	D	P	S	H	A	gY	gA	gK	gH
2001	174,708,748,190	5,107,142,857	613,720	0.73	0.57	2.21	565,009	20,110.49				
2002	187,256,595,626	6,321,703,297	634,388	0.74	0.57	2.24	603,000	19,318.11	0.069	-0.040	0.213	0.065
2003	194,222,463,541	8,205,219,780	668,165	0.75	0.58	2.28	658,795	17,415.95	0.037	-0.104	0.261	0.088
2004	231,549,914,284	9,999,725,275	732,096	0.75	0.59	2.31	748,161	17,899.94	0.176	0.027	0.198	0.127
2005	248,899,390,185	15,277,472,527	836,924	0.75	0.61	2.34	901,506	14,870.66	0.072	-0.185	0.424	0.186
2006	314,036,972,135	25,502,747,253	988,448	0.79	0.66	2.40	1,236,959	12,893.06	0.232	-0.143	0.512	0.316

[Type here]

	370,518,584,07	36,680,769,23					1,659,26	11,105.4					
2007	1	1	1,178,955	0.82	0.70	2.47	7	7	0.165	-0.149	0.363	0.294	
	435,965,343,08	47,396,703,29					2,125,97	10,172.7					
2008	5	7	1,388,962	0.84	0.72	2.54	6	1	0.163	-0.088	0.256	0.248	
	488,091,805,89	42,018,131,86					2,578,65	10,315.6					
2009	5	8	1,591,151	0.85	0.74	2.59	8	1	0.113	0.014	-0.120	0.193	
	583,720,370,65	39,134,340,65					2,976,48	11,398.4					
2010	8	9	1,765,513	0.85	0.75	2.64	3	3	0.179	0.100	-0.071	0.143	
	661,794,000,00	48,708,241,75					3,247,14	11,386.5					
2011	0	8	1,905,437	0.85	0.74	2.69	3	2	0.126	-0.001	0.219	0.087	
	692,814,000,00	50,714,835,16					3,475,50	11,229.5					
2012	0	5	2,015,624	0.84	0.74	2.75	8	8	0.046	-0.014	0.040	0.068	
	723,369,000,00	55,301,648,35					3,663,54	11,010.5					
2013	0	2	2,101,288	0.84	0.74	2.81	7	1	0.043	-0.020	0.087	0.053	
	752,151,000,00	65,559,065,93					3,831,34	10,543.1					
2014	0	4	2,172,065	0.84	0.73	2.88	4	3	0.039	-0.043	0.170	0.045	
<b>Growth 2001-</b>									-	<b>0.79</b>	-	-	
<b>2014</b>	<b>12.83%</b>	<b>19.99%</b>	<b>11.33%</b>	<b>1.31%</b>	<b>2.49%</b>	<b>2.10%</b>	<b>17.23%</b>	<b>-5.23%</b>	<b>0.37%</b>	<b>%</b>	<b>2.21%</b>	<b>0.70%</b>	

[Type here]

Constant returns to scale= 1,      alpha=0.3,      (1-a)=0.7

		Labour Productivity															
		$\Delta$ GDP/GDP	$\Delta$ K/K	$\Delta$ p/p	$\Delta$ P/P	$\Delta$ a/a	$\Delta$ u	$\Delta$ y/y	$\Delta$ k/k	$\Delta$ A/A	$\alpha \cdot \Delta$ k/k	$(1-\alpha) \cdot \Delta$ P/P	$(1-\alpha) \cdot \Delta$ p/p	$(1-\alpha) \cdot \Delta$ a/a	minus $(1-\alpha) \cdot \Delta$ u	$\alpha(K)$	$1-\alpha(L)$
2001-2014	QTR	-0.001	-0.027	-0.001	-0.003	-0.002	0.000	<b>-0.022</b>	-0.024	<b>0.1.21</b>	<b>-0.92</b>	<b>-0.002</b>	<b>-0.001</b>	<b>-0.001</b>	<b>0.000</b>	0.333	0.667
2001-2005	QTR	<b>-0.019</b>	<b>0.079</b>	<b>0.009</b>	<b>0.037</b>	<b>-0.002</b>	<b>0.000</b>	<b>-0.62</b>	0.042	<b>-8.30</b>	<b>3.65</b>	<b>0.025</b>	<b>0.006</b>	<b>-0.001</b>	<b>0.000</b>	0.333	<b>0.667</b>
2005-2010	QTR	0.012	-0.156	-0.006	-0.008	-0.003	0.000	<b>0.03</b>	-0.148	<b>8.30</b>	<b>-6.01</b>	<b>-0.006</b>	<b>-0.004</b>	<b>-0.002</b>	<b>0.000</b>	0.333	0.667
2010-2014	QTR	-0.019	0.035	-0.001	-0.019	-0.003	0.000	<b>-1.93</b>	0.054	<b>1.93</b>	<b>1.81</b>	<b>-0.013</b>	<b>-0.001</b>	<b>-0.002</b>	<b>0.000</b>	0.333	<b>0.667</b>

[Type here]

### 23. Country approach; growth accounting calculations for the KWT.

Data for KTW	GDP (constant LCU)	Gross capital formation (constant LCU)	Population , total	Pop 15-64 Share of Total Populatio n	Labour force participatio n rate, total (% of total pop 15-64)	Years of educatio n per worker	Human Capital Adjusted Labour Input	TFP	<u>Growth Rate of</u>			
	Y	K	L	D	P	S	H	A	gY	gA	gK	gH
2001	21,190,256,600	4,991,848,712	1,990,022	0.71	0.49	2.10	1,454,093	1,267.19				
2002	21,825,964,300	6,531,753,866	2,042,215	0.71	0.50	2.10	1,510,719	1,172.29	0.030	-0.078	0.269	0.038
2003	25,606,221,400	7,963,087,248	2,095,993	0.71	0.50	2.09	1,569,702	1,261.68	0.160	0.073	0.198	0.038
2004	28,362,012,700	10,810,994,231	2,166,344	0.72	0.50	2.09	1,626,347	1,243.74	0.102	-0.014	0.306	0.035
2005	31,219,755,200	13,273,972,603	2,263,604	0.71	0.50	2.09	1,687,006	1,254.72	0.096	0.009	0.205	0.037
2006	33,567,558,600	16,409,372,846	2,389,498	0.72	0.50	2.10	1,824,257	1,198.48	0.073	-0.046	0.212	0.078

[Type here]

	35,578,813,00	23,451,794,51											
2007	0	1	2,538,591	0.73	0.51	2.11	1,975,048	1,079.53	0.058	-0.105	0.357	0.079	
	36,461,112,00	25,985,863,09											
2008	0	5	2,705,290	0.73	0.51	2.12	2,137,796	1,014.92	0.024	-0.062	0.103	0.079	
	33,881,086,30	19,037,526,06											
2009	0	0	2,881,243	0.74	0.51	2.14	2,331,094	974.50	-0.073	-0.041	-0.311	0.087	
	33,079,100,00	20,381,367,76											
2010	0	0	3,059,473	0.75	0.52	2.15	2,531,345	879.91	-0.024	-0.102	0.068	0.082	
	36,264,100,00	20,867,753,62											
2011	0	3	3,239,181	0.75	0.52	2.16	2,713,147	912.44	0.092	0.036	0.024	0.069	
	38,667,100,00	22,341,907,82											
2012	0	4	3,419,581	0.75	0.52	2.17	2,918,311	905.76	0.064	-0.007	0.068	0.073	
	39,111,400,00	24,994,710,86											
2013	0	0	3,593,689	0.75	0.53	2.19	3,128,411	843.77	0.011	-0.071	0.112	0.070	
	39,307,000,00	26,493,323,96											
2014	0	3	3,753,121	0.76	0.53	2.20	3,314,951	800.19	0.005	-0.053	0.058	0.058	
<b>Growth 2001-</b>									-	-	-	<b>0.30</b>	
<b>2014</b>	<b>4.44%</b>	<b>11.66%</b>	<b>5.23%</b>	<b>0.57%</b>	<b>0.55%</b>	<b>0.40%</b>	<b>6.75%</b>	<b>-3.78%</b>	<b>0.76%</b>	<b>0.28%</b>	<b>2.28%</b>	<b>%</b>	

[Type here]

Constant returns to scale= 1,      alpha=0.3,      (1-a)=0.7

Labour Productivity																	
		ΔGDP/GD										(1-	(1-	(1-	minus(1-		
		P	ΔK/K	Δp/p	ΔP/P	Δa/a	Δu	Δy/y	Δk/k	ΔA/A	α·Δk/k	α)·ΔP/P	α)·Δp/p	α)·Δa/a	α)·Δu	α(K)	1-α(L)
2001-	KW						-								0.33333333	0.66666666	
2014	T	-1.10%	-3.35%	0.03%	0.15%	-0.01%	0.04%	<b>1.10%</b>	-3.50%	<b>0.07%</b>	<b>1.17%</b>	<b>0.10%</b>	<b>0.02%</b>	<b>-0.01%</b>	<b>0.03%</b>	3	7
2001-	KW														0.33333333		
2005	T	<b>3.04%</b>	<b>12.14%</b>	<b>0.25%</b>	<b>1.68%</b>	<b>0.14%</b>	<b>0.00%</b>	<b>3.04%</b>	10.45%	<b>1.30%</b>	<b>3.48%</b>	<b>1.12%</b>	<b>-0.17%</b>	<b>-0.10%</b>	<b>0.00%</b>	3	<b>66.7%</b>
2005-	KW														0.33333333	0.66666666	
2010	T	-4.35%	13.75%	0.12%	0.17%	0.05%	0.31%	<b>4.35%</b>	13.58%	<b>0.03%</b>	<b>4.53%</b>	<b>-0.11%</b>	<b>0.08%</b>	<b>0.03%</b>	<b>0.21%</b>	3	7
2010-	KW														0.33333333		
2014	T	0.13%	0.74%	0.05%	0.43%	-0.07%	0.43%	<b>0.13%</b>	1.16%	<b>0.33%</b>	<b>0.39%</b>	<b>-0.29%</b>	<b>0.03%</b>	<b>-0.05%</b>	<b>-0.29%</b>	3	<b>66.7%</b>

[Type here]

## 24. Country approach; growth accounting calculations for the OMN.

Data for OMN	GDP (constant LCU)	Gross capital formation (constant LCU)	Population , total	Pop 15-64 Share of Total Populatio n	Labour force participatio n rate, total (% of total pop 15-64)	Years of educatio n per worker	Human Capital Adjusted Labour Input	TFP	<u>Growth Rate of</u>			
									gY	gA	gK	gH
	Y	K	L	D	P	S	H	A	gY	gA	gK	gH
2001	17,036,700,000	3,347,984,395	2,272,547	0.61	0.35	1.03	491,429	2,454.30				
2002	16,849,200,000	3,828,088,427	2,323,203	0.61	0.35	1.03	511,171	2,268.24	-0.011	-0.079	0.134	0.039
2003	16,399,500,000	5,019,245,774	2,385,075	0.62	0.35	1.03	537,832	1,964.20	-0.027	-0.144	0.271	0.051
2004	16,611,400,000	6,909,492,848	2,448,194	0.63	0.36	1.03	566,758	1,742.59	0.013	-0.120	0.320	0.052
2005	17,025,100,000	6,659,557,867	2,506,891	0.63	0.36	1.05	608,006	1,719.18	0.025	-0.014	-0.037	0.070
2006	17,939,700,000	10,104,811,443	2,553,376	0.65	0.38	1.05	663,590	1,503.58	0.052	-0.134	0.417	0.087
2007	18,738,500,000	14,425,747,724	2,593,750	0.67	0.39	1.05	716,131	1,338.13	0.044	-0.117	0.356	0.076
2008	20,275,000,000	22,223,667,100	2,652,281	0.69	0.41	1.05	773,210	1,205.34	0.079	-0.105	0.432	0.077
2009	21,514,300,000	13,649,154,746	2,762,073	0.70	0.42	1.05	852,584	1,382.55	0.059	0.137	-0.487	0.098

[Type here]

2010	22,547,600,000	14,905,591,678	2,943,747	0.71	0.44	1.12	1,025,533	1,240.03	0.047	-0.109	0.088	0.185
2011	22,298,000,000	16,172,431,730	3,210,003	0.73	0.46	1.13	1,226,478	1,055.78	-0.011	-0.161	0.082	0.179
2012	24,379,000,000	18,946,684,005	3,545,192	0.74	0.49	1.13	1,457,206	975.64	0.089	-0.079	0.158	0.172
2013	25,445,000,000	23,537,061,118	3,906,912	0.76	0.51	1.13	1,699,572	856.72	0.043	-0.130	0.217	0.154
2014	26,092,000,000	20,062,418,726	4,236,057	0.76	0.52	1.13	1,917,779	846.90	0.025	-0.012	-0.160	0.121
<b>Growth 2001-2014</b>									<b>0.42</b>	<b>0.27</b>	<b>-</b>	<b>1.11</b>
	<b>3.90%</b>	<b>14.62%</b>	<b>4.47%</b>	<b>1.90%</b>	<b>3.42%</b>	<b>0.92%</b>	<b>10.71%</b>	<b>-7.99%</b>	<b>%</b>	<b>%</b>	<b>2.10%</b>	<b>%</b>
<b>Constant returns to scale= 1, alpha=0.3, (1-a)=0.7</b>												

<b>Labour Productivity</b>																	
		$\Delta$ GDP/GD									(1-	(1-	(1-	minus(1-	$\alpha$ (K)	1- $\alpha$ (L)	
		P	$\Delta$ K/K	$\Delta$ p/p	$\Delta$ P/P	$\Delta$ a/a	$\Delta$ u	$\Delta$ y/y	$\Delta$ k/k	$\Delta$ A/A	$\alpha \cdot \Delta$ k/k	$\alpha) \cdot \Delta$ P/P	$\alpha) \cdot \Delta$ p/p	$\alpha) \cdot \Delta$ a/a	$\alpha) \cdot \Delta$ u		
2001-	OM							-			-				0.33333333	0.66666666	
2014	N	-0.26%	-2.91%	0.24%	0.71%	0.03%	0.04%	<b>0.26%</b>	-3.63%	<b>0.26%</b>	<b>1.21%</b>	<b>0.48%</b>	<b>0.16%</b>	<b>0.02%</b>	<b>0.03%</b>	3	7
2001-	OM				<b>0.86</b>					-					0.33333333		
2005	N	<b>1.00%</b>	<b>6.16%</b>	<b>0.27%</b>	<b>%</b>	<b>0.34%</b>	<b>0.00%</b>	<b>1.00%</b>	5.29%	<b>1.76%</b>	<b>1.76%</b>	<b>0.57%</b>	<b>0.18%</b>	<b>0.23%</b>	<b>0.00%</b>	3	<b>66.7%</b>
2005-	OM		-					-	-		-				0.33333333	0.66666666	
2010	N	-0.11%	10.77%	0.43%	0.43%	0.23%	0.31%	<b>0.11%</b>	11.20%	<b>3.00%</b>	<b>3.73%</b>	<b>0.28%</b>	<b>0.29%</b>	<b>-0.15%</b>	<b>0.21%</b>	3	7
2010-	OM							-			-				0.33333333		
2014	N	-0.35%	-3.22%	0.21%	0.49%	0.17%	0.43%	<b>0.35%</b>	-3.71%	<b>1.11%</b>	<b>1.24%</b>	<b>0.32%</b>	<b>-0.14%</b>	<b>-0.11%</b>	<b>-0.29%</b>	3	<b>66.7%</b>

## 25. DECLARATION

### DECLARATION

I, the undersigned (name: Yahya Zakaeryya Hassan Alshehhi, date of birth: 13/02/1972) declare under penalty of perjury and certify with my signature that the dissertation I submitted in order to obtain doctoral (PhD) degree is entirely my own work.

Furthermore, I declare the following:

- I examined the code of the Károly Ihrig Doctoral School of Management and Business Administration and I acknowledge the points laid down in the code as mandatory;
- I handled the technical literature sources used in my dissertation fairly and I conformed to the provisions and stipulations related to the dissertation;
- I indicated the original source of other authors' unpublished thoughts and data in the references section in a complete and correct way, considering the prevailing copyright protection rules;
- No dissertation which is fully or partly identical to the present dissertation was submitted to any other university or doctoral school for the purpose of obtaining a PhD degree.

Debrecen, 2017, September, 20.

Yahya Alshehhi

-----  
Name

signature