

# ECONOMIC GROWTH STUDY ( IN THE CASE OF DARKHAN-UUL PROVINCE)

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## Abstract

*Economic growth is a necessary condition for economic development to improve the livelihoods for dweller countries or regions. In this article, we review the literature focusing on economic growth. We examined the economic growth rates of Darkhan-Uul province from 2000-2017 and determined the key factors affecting economic growth. Also we studied a sector analysis in the economic growth of Darkhan Uul province. We defined the influential coefficients of economic growth, such as labor productivity and number of employees, per capita production, and labor capita.*

**Keywords**— *Gross domestic product, economic growth models, economic growth rate\*, economic growth factors,*

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## I. INTRODUCTION

We define economic growth in an economy by an outward shift in its Production Possibility Curve (PPC). Economic growth is measured by the increase in a country's total output or real Gross Domestic Product (GDP). The Gross Domestic Product (GDP) of a country is the total value of all final goods and services produced within a country over a period of time. Therefore an increase in GDP is the increase in a country's production. The real economic growth rate is expressed as a percentage that shows the rate of change for a country's GDP from one period to another, typically from one year to the next.

In recent years, our researchers have analyzed the factors of dependence on economic growth in human development, impacts on manufacturing, financial intermediation. There is a need to study the role of a particular sector, including the impact of labor and capital on the production of the four processing industries.

## II. THEORETICAL PART

The modern growth theory is based on the Ramsey (1928) consumer optimization model. In the 1960, Rostow published *The Stages of Economic Growth: Which proposed the Rostovian take-off model of economic growth*, one of the major historical models of economic growth, which argues that economic modernization occurs in five basic stages of varying length: traditional society, preconditions for take-off, take-off, drive to maturity, and high mass consumption. This became one of the important concepts in the theory of modernization in social evolution.

The Solow–Swan model is an economic model of long-run economic growth set within the framework of neoclassical economics. It attempts to explain long-run economic growth by looking at capital accumulation, labor or population growth, and increases in productivity, commonly referred to as technological progress. At its core is a neoclassical (aggregate) production function, often specified to be of Cobb–Douglas type, which

enables the model "to make contact with microeconomics". The model was developed independently by Robert Solow and Trevor Swan in 1956 and superseded the Keynesian Harrod–Domar model.

Mathematically, the Solow–Swan model is a nonlinear system consisting of a single ordinary differential equation that models the evolution of the per capita stock of capital. Due to its particularly attractive mathematical characteristics, Solow–Swan proved to be a convenient starting point for various extensions. For instance, in 1965, David Cass and Tjalling Koopmans integrated Frank Ramsey's analysis of consumer optimization creates what is now known as the Ramsey–Cass–Koopmans model.

#### *Neo-Classical model of Solow/Swan*

The neo-classical theory of economic growth suggests that increasing capital or labour leads to diminishing returns. Therefore, increasing capital has only a temporary and limited impact on increasing the economic growth. As capital increases, the economy maintains its steady-state rate of economic growth.

#### *Criticisms of this neo-classical (Exogenous model)*

It doesn't explain why countries have different levels of investment as % of GDP. Some developing countries don't attract higher levels of investment because of structural problems such as corruption, lack of infrastructure. It doesn't explain how to improve rates of technological progress.

#### *Harrod Domar model – Savings Ratio and Investment*

The Harrod-Domar model is a type of neo-classical model. It states growth rate depends on a function of the savings rate. Some growth theories place a large emphasis on increasing domestic savings. Savings provide the necessary funds to finance investment. It is this investment which creates further growth. This has been an important factor behind the economic growth. However, it depends on how efficient the investment is. If savings is too high it leads to lower growth because people cannot afford to consume.

#### *New Economic Growth Theories (Endogenous growth)*

Endogenous growth models, developed by Paul Romer and Robert Lucas placed greater emphasis on the concept of human capital. How workers with greater knowledge, education and training can help to increase rates of technological advancement. The model places emphasis on increasing both capital and labor productivity. States that increasing labor productivity does not have diminishing returns, but, may have increasing returns. They argue that increasing capital does not necessarily lead to diminishing returns as Solow predicts. They say it is more complicated; it depends on the type of capital investment.

### III. ANALYSIS OF FACTORS THAT AFFECT THE ECONOMIC GROWTH

#### *Introduction to Darkhan-Uul province*

With 105000 residents, Darkhan is the second largest city in Mongolia, but is still less than one-tenth the population size of the capital city, Ulaanbaatar. Darkhan is located in central Mongolia, approximately 236 km northwest of Ulaanbaatar, in Darkhan-Uul province. Eighty-five percent of the province's population live in Darkhan city. The infrastructure is better developed than most other province's centers, and certainly than other soums.

#### *Economic growth analyses*

Mongolia is a sparsely populated country with a total population of 3.2 million. The main driver of this rapid economic expansion has been the mining industry's development. Mongolia is richly endowed with natural resources.

Darkhan-Uul province is one of the major center for the Mongolian economy The size of 2000-2016 GDP of Darkhan-Uul province is an example of a dynamics and the growth cycle should be considered to be fluctuating.

Dynamic row's basic indicators. The average amount of GDP in Darkhan-Uul province between 2000 and 2016 calculated by the means of determining the average dynamics of the interval dynamics.

$$\bar{y} = (\sum y) / n = 2,685,142.14 / 17 = 157949.54$$

From the above results In Darkhan-Uul province's GDP was 157949.54 million MNT per year over the last 17 years.

In 2000-2016, the dynamic row of GDP in Darkhan-Uul province are shown the baseline data for the following indicators.

TABLE 1. REAL GDP GROWTH

Year	Real GDP ( by price of 2005)	Absolute net growth (million MNT)	Speed of growth	The speed of the net growth rate (%) Real GDP growth
2000	25650.3	-	-	-
2001	36798.28	11148.0	43.5	-39.5
2002	38251.28	1453.0	3.9	0.6
2003	39980.87	1729.6	4.5	17.4
2004	48755.53	8774.7	21.9	-9.3
2005	54928.74	6173.2	12.7	-4.0
2006	59692.65	4763.9	8.7	29.9
2007	82697.43	23004.8	38.5	25.2
2008	135380.7	52683.3	63.7	-69.6
2009	127433.55	-7947.2	-5.9	34.4
2010	163790.6	36357.1	28.5	-11.1
2011	192344	28553.4	17.4	16.7
2012	258060.3	65716.3	34.2	-15.9
2013	305144	47083.7	18.2	0.4
2014	362087.7	56943.7	18.7	-17.2
2015	367262.7	5175.0	1.4	3.9
2016	386883.5	19620.8	5.3	-5.3

Economic growth of Darkhan-Uul aimag was slowly increasing between 2000 and 2007, Due to the impact of dzud in 2009, it has been sharply declining in 2009 and is gradually increasing. This cyclical growth has continued until the end of 2013

In 2014, growth has been gradually declining, with a high growth in the following next two years.

The table analysis shows that the following regression equations are available

$$\bar{y} = a_0 + a_1 t = 25650.3 + 11288.8t$$

Industry in an aggregate category:

- Primary or extractive industries
- Secondary or processing sectors
- Third-party or service industries

Now let's look at the structure of the economy in the last 15 years of Darkhan-Uul province (Figure 1).

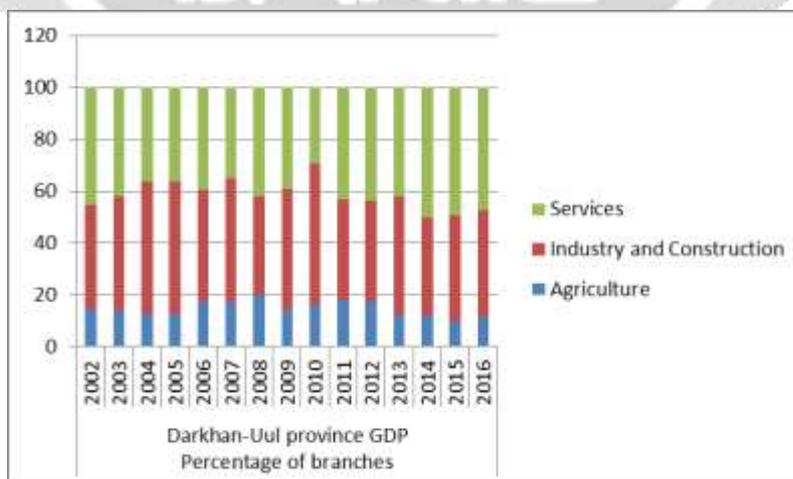


Figure 1. Percentage of GDP, by sectors

In the year 2005, agriculture accounted for 14.9 percent, industrial and construction 41.7 percent and service sector 43.4 percent, In 2008, agriculture accounted for 20 percent, manufacturing and construction 40.1 percent and service sector 42.9 percent and As of 2016, the industry and services sector dominated.

The three main index analyzes were then analyzed.

a) Labor productivity and number of employees and their impact

The main factors in the manufacturing sector that affect GDP growth and decline are quality in terms of labor productivity and quantity of employees.

It has affected the Darkhan-Uul aimag's 2000-2016 GDP change by productivity. The number of employees are determined by the following index method.

The total absolute growth of 2000-2016 GDP was 48.5% in the number of employees, 51.5% in total labor productivity changes. The following graphic illustrates the annual impact of this change.

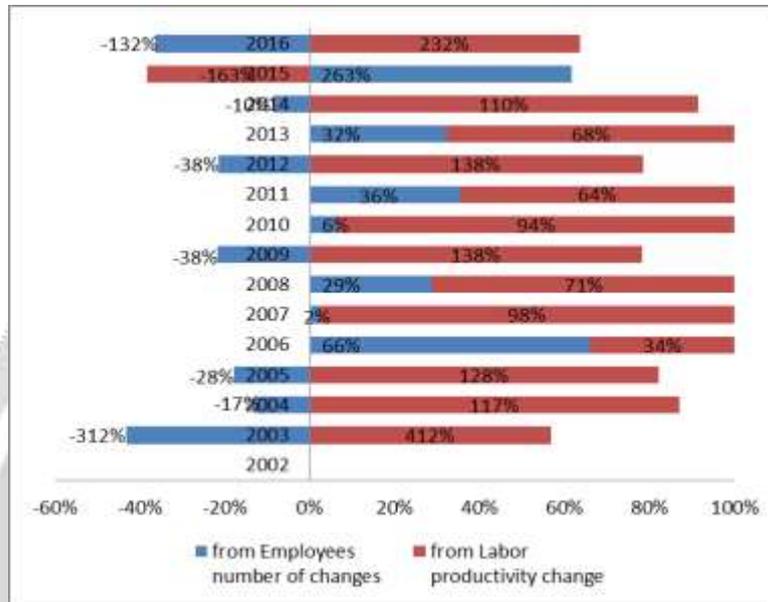


Figure 2. Absolute growth of GDP

In 2002-2005, labor productivity was dominant in economic growth and in 2006, there was a significant increase in the number of employees in the growth.

Since 2008, the productivity growth has been largely driven by economic growth. In other words, economic growth in Darkhan-Uul province's production quality is high and the number of employee changes is low. Therefore, it is possible to maintain long-term economic growth by maintaining efficiency as in recent years and by increasing labor productivity.

b) Per capita production and per labor capita, number of employees impact

Let us consider the impact of per capita production and per labor capita, number of employees impact to Darkhan-Uul province on GDP growth and decline. In order to do so, investment information is essential. From the results of the survey, the total absolute growth of 2002-2016 of GDP in Darkhan-Uul province increased by per capita production by 10%, labor productivity by 62% and the number of employees by 28%.

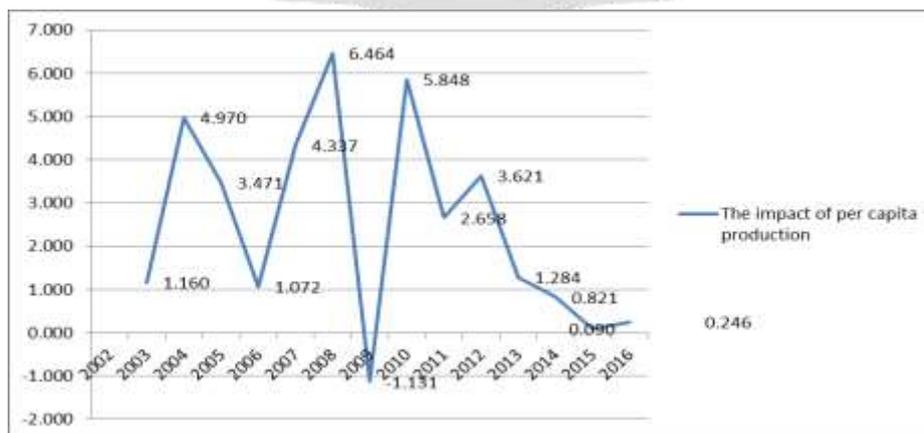


Figure 3. Per capita production, 2002-2016, (tug)

Excluding 2008 decrease in production per unit of capital is in line with the principle of diminishing marginal productivity. With the Solow model, the marginal product of capital is slowly decreasing, resulting in total production reaching the highest possible level.

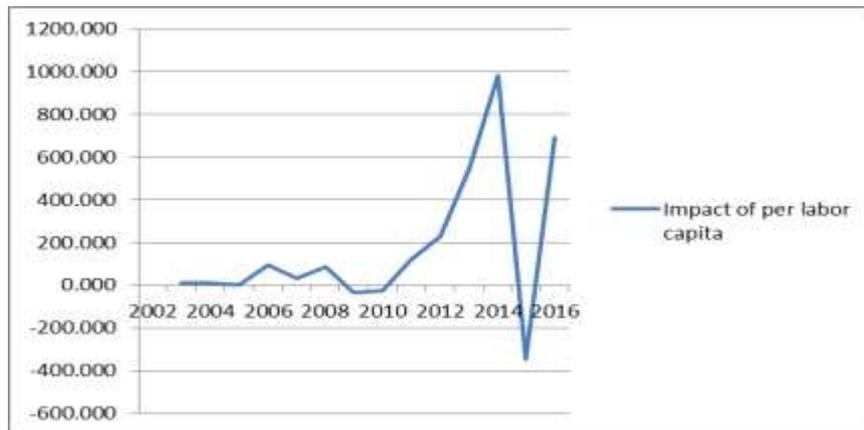


Figure 3. Per capita production, 2002-2016, (tug)

There is an inverse relationship between capita production and per labor capita each other. It is increasing labor productivity of employees, increasing the opportunity to win time, improving output and increasing total production. New technologies are developed in developed countries, and they are labor-saving technologies rather than capital.

c) A study of the many factors that influence GDP growth

Multiple factor indexes of GDP growth are divided by

$$GDP = \frac{GDP}{A} * \frac{A}{E} * \frac{E}{LF} * \frac{LF}{P} * P$$

Five factors calculations have been made.

$\frac{GDP}{A}$  – Employed per person GDP per day productivity

$\frac{A}{E}$  – Number of days worked per year per employee

$\frac{E}{LF}$  –Percentage of employed economically active population

P - Total population

The results of the analysis are shown in Table 2.

Year	LF	E	GDP (mil)	A=E*D	GDP /A	A/E	E/LF	LF/P
2000	22295	20553	25650	5343780	4,8	260	0.92	0.26
2001	25351	23847	36798	6176373	5,9	259	0.94	0.29
2002	24359	23121	38251	5872734	6,5	254	0.94	0.27
2003	29349	28442	39980	7281152	5,4	256	0.96	0.33
2004	27933	27363	48755	7004928	6,6	256	0.97	0.31
2005	27239	26402	54928	6706108	8,1	254	0.96	0.30
2006	28799	27918	59692	7119090	8,3	255	0.96	0.32
2007	29223	28157	82697	7208192	11,4	256	0.96	0.32
2008	34491	33332	135380	8466328	15,9	254	0.96	0.37
2009	40359	34079	127433	8724224	14,6	256	0.84	0.43

2010	38985	34694	163790	8846970	18,5	255	0.88	0.41
2011	40211	36843	192344	9358122	20,5	254	0.91	0.41
2012	37451	32078	258060	8211968	31,4	256	0.85	0.38
2013	36955	33969	305144	8696064	35,1	256	0.91	0.37
2014	36749	33315	362087	8462010	42,8	254	0.90	0.36
2015	39839	34567	367262	8849152	41,5	256	0.86	0.39
2016	37992	32125	386883	8191875	47,2	255	0.84	0.37

The total absolute growth of 2002-2016 of GDP in Darkhan-Uul province increased by 10% in the number of days worked per year per employee, the number of days of worked per employee increased 11%, the percentage of employed economically active population decreased by 9%, labor productivity was 88%, the economically active population was 10%, the total population was 21% have been increased..

#### IV. CONCLUSION

This article analyzes the dynamics and structural analysis of GDP and factors affecting GDP growth.

The survey in the year of 2005, agriculture accounted for 14.9 percent, industrial and construction 41.7 percent and service sector 43.4 percent. In 2008, agriculture accounted for 20 percent, manufacturing and construction 40.1 percent and service sector 42.9 percent and as of 2016, the industry and services sector dominated. There is an inverse relationship between per capita production and per labor capita. It is good to say that per labor capita is slowly increasing. It is increasing labor productivity of employees, increasing the opportunity to win time, improving output and increasing total production.

New technologies are developed first world countries, and they are labor-saving technologies rather than capital.

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