A Study of Trends in India’s Economic Growth since 1951: The Inclusive Growth Approach

Arjun. Y. Pangannavar *

ABSTRACT

This paper focuses on the saga of India’s economic growth under the ‘Nehru-Mahalanobis Economic Growth Model’ (NMEGM) and ‘Narsimhrao-Mannohman Singh Economic Growth Model’ (NMSEGM). The NMEGM continued till 1990 unceasingly; Indira Gandhi’s social control had supported the model to place India’s economic growth at a high level. After becoming a member of World trade Organization (WTO), India entered the epoch of world new economic order and initiated new economic reforms. It followed globalisation, liberalisation and privatisation policies to achieve double digit economic growth rate. This model is popularly known as ‘Narsimhrao-Mannohman Singh Economic Growth Model’. Based on past trends and new changes, this paper attempts to assess the impact of NMSEGM on future economic growth. India has practiced both endogenous and exogenous models of economic growth. The endogenous model was in operation from 1956-57 till 1990-91 that placed economic growth rate at more than 5%. However, from 1990-91, the new economic reforms have followed the exogenous model that has raised economic growth rate to nearing double-digit; but, the decadal economic growth rate has shown a declining trend. This paper attempts to assess the growth rate trends of Indian economy by using the measuring tool called ‘Inclusive Growth’ to get a fair and true picture.

Keywords: Economic Growth Models, Indian GNP, Inclusive Growth, NMSEGM, NMEGM, Human Capital Investment, Natural Capital Investment.

1.0. Introduction

A number of research studies have been conducted by economists on economic growth in general and country-wise economic growth in particular. They have generated knowledge about the economic-growth-concept, its determinants, measurement, policy and effects.

*Associate Professor of Economics, JSS Arts, Science & Commerce College, Gokak, Karnataka.
The main determinants of economic growth have undergone changes as per the requirement of the changing context and thinking; the environment has to be assigned paramount position in defining ‘economic growth’ in the present-day context.

1.1 Statement of problem

The economic growth concept has undergone change to suit the present day changes and requirements. Gross Domestic Product (GDP) or Gross National Product (GNP) is not the sufficient indicator to define or measure the economic growth of a country, poor and rich. The economic growth has to be included with the growth of resources including environment factor. The economic growth should take place not at the cost of or by depleting the natural resources but it should be accompanied with the growth of natural resources as well as maintaining ecological balance in the economy. GNP growth inclusive of natural resources growth along with ecological balance must be the measure of economic growth rate. The empirical research approach is used to study the trends, the causes and impact of economic growth of India since 1951.

1.2 Importance and objectives of the study

The traditional measurement of economic growth rate is no longer enough as it does not take into account the importance of environmental protection, human capitalisation and population growth aspects while computing growth trends. In the present day context, these aspects have become relevant because in many cases, higher economic growth is being achieved at the cost of environmental degradation and human rights violation. Thus, there is need for redefining the term ‘economic growth’ by giving importance to environment-protection and thereby natural capital growth. This study attempts to fill this measurement gap. The main objective of this paper is to assess India’s economic growth during 1951-52 to 2010-2011 and find out if it is broad-based and inclusive.

2.0 Review of Literature

There are different views on the meaning of ‘economic growth’ but it is mainly concerned with the changes in a nation’s GNP over the specific period of time, generally a year. The GNP comprises the total value of total production of goods and services produced from different sectors of economy by using resources and technology (IMF, 2012). It can be estimated or calculated either in terms of constant price or market/current price. If it is calculated in terms of constant/base year price, it is known as ‘Real Economic Growth (REG)’. If it is calculated in terms of
current/market price, it is known as ‘Nominal Economic Growth (NEG)’. The real economic growth gives real picture of the achievement of the economy with success or failure of either governance or policies or both. The difference between REG and NEG gives the extent of inflationary situation in the economy.

The economic concept of growth is as old as human civilization. In Indian Vedic period, we find a mention of this concept in Valmiki’s *Ramayana*, a great epic of the world, as Vedic values of want/desire(*kaam*), wealth (*artha*), policy (*dharma*/Religion) and salvation/satisfaction (*moksha*). The emperors and kings used to worship the ‘Goddess of Wealth’ (*Lakshmi*) to improve nation’s wealth in terms of production, assets and resources. These things also find a mention in Kautilya’s ‘Principles of Political Economy’ (*Arth Shastra*). In 1377, Ibn Khaldun, the Arabian economic thinker, had provided one of the earliest descriptions of economic growth in his famous *Muqaddimah*, which is known as ‘Prolegomena’ in the Western world.

In the early modern period, some people in Western European nations had developed the idea of ‘economic growth’; that is, to produce a greater economic surplus which could be expended on something other than mere subsistence. This surplus could then be used for consumption, warfare, or civic and religious projects. The previous view was that only increasing either population or tax rates could generate more surplus money for the Crown or country to achieve economic growth (Erber & Hagemann, 2002).

The concept of ‘economic growth’ is a long-run process which indicates increase in total national output/income in long-run. The short-run fluctuations in national-output are considered as ‘business cycles’; so economists draw a distinction between short-term economic stabilization and long-term economic growth (Barro, 1997). The concept ‘economic growth’ is different from the concept ‘economic development’: economic growth is a narrow concept because it focuses on only national output but economic development is broad concept because it focuses on national output as well as quality of life. An increase in growth caused by more efficient use of inputs is referred to as intensive growth. GDP growth caused only by increases in inputs such as capital, population or territory is called extensive growth (Bjork, 1999). However, now it is generally recognised that economic growth also corresponds to a process of continual rapid replacement and reorganisation of human activities facilitated by investment and motivated to maximise returns.

In the course of time a good number of theories have developed to explain the causes and effects of economic growth and measurement of economic growth rate. The mercantilists’ ‘Bullionist Theory of Economic growth’, during the early modern times, had considered economic growth as increase in total amount of gold and silver under state-control through expansion of trade and creation of colonies abroad. Later, the
‘Bullionist Theory’ supported increase the producing capacity of manufacturing industries, so as to boost their exports abroad at low-price and avoid foreign competition with a view to establish their trade supremacy abroad. Under this theory of growth, the road to increased national wealth was to grant monopolies, for instance Dutch East India company, and British East India company. This would give an incentive for an individual to exploit a market or resource, confident that he would make all of the profits when all other extra-national competitors were driven out of business. This theory was unacceptable because of its ‘tit for tat policy’ that begets wars among the nations. The Physiocrats, Scottish Enlightenment Thinkers such as David Hume and Adam Smith criticised the mercantilists’ theory of growth and begot the modern concept of economic growth; the rise of ‘Classical Economic Growth Theory’ and foundation of Modern Political Economics. The theory of the Physiocrats was that productive capacity, itself, allowed for growth, and thus there should be increasing capital to allow that capacity i.e. ‘the wealth of nations’. These classical economists stressed the importance of agriculture and saw urban industry as ‘sterile’. Smith extended the notion that manufacturing was central to the entire economy and capital formation and division of labour as causal factors of economic growth. David Ricardo would then argue that trade was a benefit to a country, because if one could buy a good more cheaply from abroad, it meant that there was more profitable work to be done here. This theory of ‘comparative advantage’ would be the central basis for arguments in favour of free trade as an essential component of growth. However, the growth in income per capita was essentially flat until the Industrial Revolution. Thomas Malthus in his ‘Essay on the Principle of Population’ said that “any growth in the economy would translate into a growth in population.” The mainstream theory of economic growth states that with the industrial revolution and advancements in medicine, life expectation increased, infant mortality decreased, and the payoff to receiving an education was higher. Thus, parents began to place more value on the quality of their children and not on the quantity. This led to a drop in the fertility rates of most industrialised nations. This is known as the breakdown of the Malthusian regime. With income increasing faster than population growth, industrialised economies substantially increased their incomes per capita in the next centuries. Thus, although aggregate income could increase, income per capita was bound to stay roughly constant. In brief, the classical theory of production and the theory of growth are based on the theory or law of variable proportions, whereby increasing either of the factors of production viz. labor and capital, while holding the other constant and assuming no technological change, will increase output, but at a diminishing rate that eventually will approach zero. These concepts have their origins in Thomas Malthus’s theorising about agriculture. Malthus’s examples included the number of seeds harvested
relative to the number of seeds planted (capital) on a plot of land and the size of the
harvest from a plot of land versus the number of workers employed. Criticisms of
classical growth theory are that technology, the most important factor in economic
growth, is held constant and the economies of scale are ignored (Foley, 1999).

The Harrod–Domar Model was an early post-Keynesian model of economic
growth. The model was developed independently by Roy F. Harrod (1939) and Evsey
Domar (1946). The Harrod–Domar model was initially created to analyse the business
cycles, it was later adapted to explain economic growth. Its implications were that
growth depends on the quantity of labour and capital; more investment leads to capital
accumulation, which generates economic growth. The model carries implications for less
economically developed countries, where labour is in plentiful supply in these countries
but physical capital is not, slowing down economic progress (Jones, 2002). It is used in
developing countries to explain an economy's growth rate in terms of the level of saving
and productivity of capital. It suggests that there is no natural reason for an economy to
have balanced growth. In brief, the model implies that economic growth depends on
policies to increase investment, by increasing saving, and using that investment more
efficiently through technological advances. The Harrod–Domar model mentioned three
kinds of growth viz. warranted growth, actual growth and natural rate of growth. The
model concludes that an economy does not ‘naturally’ find full employment and stable
growth rates. The main criticism of the model is the level of assumption, one being that
there is no reason for growth to be sufficient to maintain full employment; this is based
on the belief that the relative price of labour and capital is fixed, and that they are used in
equal proportions. Perhaps the most important parameter in the Harrod–Domar model is
the rate of savings but the model fails to explain the distribution of income which
determines the per capita income that influences on rate of savings. The neoclassical
economists claimed shortcomings in the Harrod–Domar model, and, by the late 1950s,
started an academic dialogue that led to the development of the Solow–Swan model.

According to ‘Neo-Classical Economic Growth Theory’ the notion of growth is
increased stocks of capital goods, which is popularly known as the ‘Solow-Swan Growth
Model’ (1950s). The model shows the relationship between labour-time, capital goods,
output, and investment. It argued that the technological change plays a crucial role and
even more important than the accumulation of capital. It was the first attempt to model
long-run growth analytically. This model assumes that countries use their resources
efficiently and that there are diminishing returns to capital and labour (Weil, 2008). On
the basis of these two assumptions, the neoclassical model makes three important
predictions. First, increasing capital relative to labor creates economic growth, since
people can be more productive, given more capital. Second, poor countries with less capital per person grow faster because each investment in capital produces a higher return than rich countries with ample capital. Third, because of diminishing returns to capital, economies eventually reach a point, called a ‘steady state’ where any increase in capital no longer creates economic growth. The model also notes that countries can overcome this ‘steady state’ and continue growing by inventing new technology. In the long run, output per capita depends on the rate of saving, but the rate of output growth should be equal for any saving rate (Solow, 1956). In this model, the process by which countries continue growing despite the diminishing returns is ‘exogenous’ and represents the creation of new technology that allows production with fewer resources. As technology improves, the steady state level of capital increases and the country increases investments and the economy grows (Swan, 1956). However, the neo-classical model has two major loopholes, first, it does not account for differing rates of return for different capital investments, and second, increasing capital creates a growing burden of depreciation.

Unsatisfied with Solow-Swan Growth model’s explanation, economists Paul Romer and Robert Lucas, Jr. have developed the ‘Endogenous Growth Theory’ that includes a mathematical explanation of technological advancement (innovation). This model also incorporated a new concept of human capital, the skills and knowledge that make workers productive. Unlike physical capital, human capital (education) has increasing rates of return. Therefore, overall there are constant returns to capital, and economies never reach a steady state. Growth does not slow as capital accumulates, but the rate of growth depends on the types of capital a country invests in (Romer, 1994).

Energy Consumption and Efficiency Economic Growth Theory recognise that energy consumption and energy efficiency were important historical causes of economic growth. The U. S. Dept. of Energy (1986) has showed that there is correlation between energy consumption and economic growth. Some of the most technologically important innovations in history involved increases in energy efficiency which include the great improvements in efficiency of conversion of heat to work, the reuse of heat, the reduction in friction and the transmission of power. Increases in energy efficiency had the effect of greatly increasing overall energy consumption. The importance of energy to economic growth was emphasized by William Stanley Jevons in ‘The Coal Question’ in which he described the rebound effect based on the observation that increasing energy efficiency resulted in more use of energy. The economists Daniel Khazzoom and Leonard Brookes have independently put forward ideas about energy consumption and behavior that argue that increased energy efficiency paradoxically tends to lead to increased energy consumption. US economist Harry Saunders has dubbed the hypothesis
of Khazzoom–Brookes Postulate and showed that it was true under neo-classical growth theory over a wide range of assumptions (Saunders, 1992).

Many economists of 20th century had the view that the entrepreneurship has a major influence on a society's rate of technological progress and thus economic growth. Joseph Schumpeter was a key figure in understanding the influence of entrepreneurs on technological progress. In Schumpeter’s ‘Capitalism, Socialism and Democracy’, published in 1942, an entrepreneur is a person who is willing and able to convert a new idea or invention into a successful innovation. Entrepreneurship forces ‘creative destruction’ across markets and industries, simultaneously creating new products and business models. In this way, creative destruction is largely responsible for the dynamism of industries and long-run economic growth. Unlike other economic growth theories, Schumpeter’s approach explains growth by ‘innovation’ as a process of creative destruction that captures the dual nature of technological progress: in terms of creation, entrepreneurs introduce new products or processes in the hope that they will enjoy temporary monopoly-like profits as they capture markets and in doing so, they make old technologies or products obsolete (Schumpeter, 1912, 1942).

Salter (1960) had developed the economic growth theory, popularly known as ‘Salter Cycle’, which advocates that one of economies of scale and learning-by-doing that lowers production costs; the lowered cost increases demand, resulting in another cycle of new capacity which leads to greater economies of scale and more learning by doing. The cycle repeats until markets become saturated due to diminishing marginal utility (Ayres, 1998). In 1970s, one more popular theory on economic growth called ‘Big-Push’ was developed to suggest that countries need to jump from one stage of development to another through a virtuous cycle in which large investments in infrastructure and education coupled to private investment would move the economy to a more productive stage, breaking free from economic paradigms appropriate to a lower productivity stage (Carlin and Soskice, 2006).

Soviet economist G. A. Feldman (1964) and Indian statistician Prashant Chandra Mahalanobis (1953) developed the economic growth model independently which is popularly known as ‘Feldman–Mahalanobis Model’ or ‘Neo-Marxist Model.’ The model suggests the strategy that in order to reach a high standard in consumption, investment in building a capacity in the production of capital goods is firstly needed. In other words, the model advocates the shift in the pattern of industrial investment towards building up a domestic consumption goods sector. According to them a high enough capacity in the capital goods sector in the long-run expands the capacity in the production of consumer goods. The distinction between the two different types of goods was a clearer formulation of Marx’s ideas in ‘Das Kapital’ and also helped people to better understand
the extent of the trade-off between the levels of immediate and future consumption. Mahalanobis introduced initially the two-sector model, which he later expanded into a four-sector version. Since he was the architect of the India’s Second Five Year Plan and supporter of then Prime Minister Nehru’s economic ideology, Nehru-Mahalanobis Economic Growth Model was introduced in 1955-56 in lieu of Harrod-Domar single sector models. Nehru-Mahalanobis Model was used till 1990; thereafter under the new economic reforms- privatisation, liberalisation and globalisation - the Narsimhrao-Manmohan Model was initiated in India since 1990.

The models of economic growth so far developed are either ‘Endogenous (Input Model) or Exogenous (Output Model). Endogenous growth model relies on the notion of investing a lot of human and financial resources to develop an expanding economy. The idea is that by investing resources in certain areas, an economy will produce sustainable growth independently of the global environment, and thus will not rely as heavily on international factors. The investment in improvement of education and technology gives better skilled and efficient workforce and the new technology that would drive the economy to the stage of higher and higher growth rate or sustained domestic growth. One of the key modern economic ideas considers the global economy, with each country interdependent on one another. The endogenous model sets out to show that this is not entirely necessary- that a country, with the proper investment, can develop sustained growth within itself without reliance on trade. In the 21st century it is debated whether or not this is possible, but modern endogenous theory works on the idea of developing a domestic economy for the future that does not rely on trade with other countries. On the other hand, the exogenous model of economic growth is an output system whereby the encouragement of business and increased production leads to economic growth through trade. The exogenous model advocates (i) increase in trained workforce through investment in education of next generation, (ii) reduction in tax to encourage investment activities, (iii) developing new ideas and technologies and (iv) free market style economy giving importance to consumers’ wants. However, the mainstream economists would argue that economies are driven by new technology and ongoing improvements in efficiency— for instance, we have faster computers today than a year ago, but not necessarily computers requiring more natural resources to build. According to these theories, economic growth is the output of its determinants like productivity, human capital development, improvements in technology, investment, physical capital, demographic changes, geographical conditions, international trade, natural resources, economic system and non-economic factors such as social and political conditions. Since economic growth refers to upward movement in national production of goods and services, its impact on economy or economic changes decides its further growth and
sustainability. This aspect of economic growth study will be dealt systematically in conducting an inquiry into India’s economic growth saga since 1951 and finding its future.

3.0 Methodology

3.1 Selection of variables

The variables selected to measure and analyse the economic growth of India since 1951 are GNP, population, gross domestic savings, gross domestic investment, human capital investment and natural capital investment. These variables are also used to project economic growth rate for 2011-2021.

3.2. Data collection

This study is based on the secondary data collected from sources viz. (i) Planning Commission of India Report (2001); Indian Planning Experience (ii) Ministry of Environment and Forests Reports (iii) RBI: Hand Book of Statistics of Indian Economy (2012-13).

3.3. Methods of data analysis

Simple mathematical and statistical treatments are used to process and analyse the data to get inferences based on analytical findings.

The main formula, models and equations used to process and assess the data are as follows:

(i) Decadal GNP growth rate is computed as: \( Y_1 - Y_0 / Y_0 \)

(ii) To find out ‘Best Fit-Line’ based on actual trends, we use the least square regression model equation \( Y = \alpha + \beta(t) \),

(iii) The equation \( Y_{t+1} = (k_{t+1} \times Y_t) + Y_t \) is used to find out estimated value of selective variables for 2020-21

(iv) Karl Pearson’s method of finding correlation co-efficient between independent variables (b, c, d, e, &f ) and dependent variables (a) i.e. \( r = \frac{\Sigma ab}{\sqrt{\Sigma a^2 \times \Sigma b^2}} \) is used and multiple correlation coefficient method, i.e. \( r_{abcdef} = \sqrt{1-(1-r_1^2)(1-r_2^2)(1-r_3^2)(1-r_4^2)(1-r_5^2)} \) is used to find out the association between the selective variables

(v) To measure the inclusive economic growth rate \( (G_i) \) the new economic growth rate measurement formula is designed and used as:

Number of Factors (denoted by ‘n’)*\((\text{Change in GNP or } \Delta Y/Y)\)/Change in Value of Factors (denoted by ‘F’)*100/Year (denoted by ‘t’) i.e. \( G_i = n (\Delta Y/Y) / F*100/t, \) and
(vi) the average, percentage methods, graphic and tabular methods are used wherever necessary.

4.0 Analysis and Discussion

India had a deplorable economic condition on the eve of its Independence. The British Government made India the market for raw materials to their industries and for the mill-made-goods of their industries. The Indian origin industries were facing various hardships- village and small scale industries were completely ruined. So, after Independence, India was to rehabilitate its economy on the basis of such economic ideology that makes India a best abode for millions of Indians to live happily and peacefully. Mahatma Gandhi wanted to establish ‘Rama Rajya’ (no hunger and starvation deaths) in India through (i) the development of indigenous industries using indigenous resources and technology and development of self-sufficient villages. But Nehru wanted to make India a modern India on the lineage of the experience of western-countries, through industrialisation. Influenced by the Soviet economic planning model, India adopted Five Year Plans for economic development. The First Five Year Plan stressed investment for capital accumulation in the spirit of the one-sector Harrod–Domar model. It argued that production required capital and that capital can be accumulated through investment; the faster one accumulates, the higher the growth rate will be. The most fundamental criticisms came from Mahalanobis, who himself was working with a variant of it in 1951 and 1952. The criticisms were mostly around the model’s inability to cope with the real constraints of the economy; its ignoring of the fundamental choice problems of planning over time; and the lack of connection between the model and the actual selection of projects for governmental expenditure. Subsequently Mahalanobis introduced his celebrated two-sector model, which he later expanded into a four-sector version. Mahalanobis model was developed on assumptions like autarky or closed economy, consumption goods sector (C) and capital goods sector (K), immobility of capital goods, full utilisation of production capacity, supply of capital goods determining investment, no changes in prices, capital being the only scarce factor and production of capital goods being independent of the production of consumer goods. This the model suggests in order to reach a high standard in consumption, investment in building a capacity in the production of capital goods is firstly needed (Mahalanobis, 1953).

The Nehru-Mahalanobis Growth model was continued till 1990 unceasingly; Indira Gandhi’s social control had supported the model to place Indian economy growth at higher level. The Industrial revolution had brought economic transition whereby the
The economy changed from agricultural character to industrial character; technical breakthrough in agriculture and rural development programs had raised the agricultural productivity; heavy investment in basic and core sector had changed the outlook of Indian economy and India became one of the world industrial powers. After formation of World trade Organization (WTO) and India becoming its signatory at inception, India entered the epoch of world new economic order and initiated new economic reforms; it followed globalisation, liberalisation and privatisation popularly known as ‘Narsimha Rao-Mannohan Singh Growth Model’ (NMGM).

We now analyse India’s economic growth during 1951-52 to 2010-2011 by using macroeconomic variables viz. Gross National Product (GNP), Population (P), Gross Domestic Savings (GDS), Gross Domestic Investment (GDI), Human Capital Development (HCD) and Natural Capital Development (NCD). Table 1 shows the actual trends of these selected macroeconomic variables and the decadal growth rates.

### Table 1: Decadal Growth Rates of Selected Macroeconomic variables of India during 1951-2011 (at 2004-05 Price)

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>GNP (Rs)</td>
<td>105.61</td>
<td>169.77</td>
<td>440.98</td>
<td>1371.83</td>
<td>5242.68</td>
<td>19780.10</td>
<td>71851.59</td>
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<tr>
<td>Pop (million)</td>
<td>365</td>
<td>434</td>
<td>541</td>
<td>679</td>
<td>839</td>
<td>1019</td>
<td>1186</td>
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<tr>
<td>GDS (Rs)</td>
<td>10.79</td>
<td>20.79</td>
<td>68.21</td>
<td>265.90</td>
<td>1344.08</td>
<td>5155.45</td>
<td>26519.34</td>
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<tr>
<td>GDI (Rs)</td>
<td>12.62</td>
<td>25.60</td>
<td>25.60</td>
<td>286.84</td>
<td>1526.04</td>
<td>5282.99</td>
<td>28716.49</td>
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<tr>
<td>HCD (Rs)</td>
<td>29.8</td>
<td>54.6</td>
<td>117.8</td>
<td>154.8</td>
<td>1299.5</td>
<td>5847</td>
<td>69467.6</td>
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<tr>
<td>NCD (Rs)</td>
<td>1.7</td>
<td>2.44</td>
<td>18.76</td>
<td>155.19</td>
<td>576.4</td>
<td>1470.01</td>
<td>1694.09</td>
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<table>
<thead>
<tr>
<th>Decadal Growth Rate</th>
<th>a</th>
<th>b</th>
<th>c</th>
<th>d</th>
<th>e</th>
<th>f</th>
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<tbody>
<tr>
<td>a</td>
<td>0.6075</td>
<td>1.5975</td>
<td>2.1109</td>
<td>2.8217</td>
<td>2.7729</td>
<td>2.6325</td>
</tr>
<tr>
<td>b</td>
<td>0.1836</td>
<td>0.2465</td>
<td>0.2551</td>
<td>0.2356</td>
<td>0.2145</td>
<td>0.1639</td>
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<tr>
<td>c</td>
<td>0.9768</td>
<td>2.2809</td>
<td>2.8983</td>
<td>4.0548</td>
<td>2.8357</td>
<td>4.1439</td>
</tr>
<tr>
<td>d</td>
<td>1.0285</td>
<td>1.8186</td>
<td>2.9756</td>
<td>4.3202</td>
<td>2.4619</td>
<td>4.4357</td>
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<tr>
<td>e</td>
<td>0.8322</td>
<td>1.1575</td>
<td>0.3073</td>
<td>7.3947</td>
<td>3.4994</td>
<td>10.8808</td>
</tr>
<tr>
<td>f</td>
<td>0.4352</td>
<td>6.6885</td>
<td>7.2723</td>
<td>2.7141</td>
<td>1.5503</td>
<td>0.1524</td>
</tr>
</tbody>
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Sources:  
(i) Planning Commission of India Report (2001); Indian Planning Experience  
(ii) Ministry of Environment and Forests Reports  
(iii) RBI: Hand Book of Statistics of Indian Economy (2012-13)

Notes: GNP=Gross National Product, Pop=Population, GDS=Gross Domestic Savings, GDI=Gross Domestic Investment, HCD=Human Capital development, NCD=Natural Capital Development  
\( a = \text{GNP decadal growth rate} \); \( b = \text{Population decadal growth rate} \); \( c = \text{GDS decadal growth rate} \)  
\( d = \text{GDI decadal growth rate} \); \( e = \text{HCD decadal growth rate} \); \( f = \text{NCD decadal growth rate} \)
The trends represented by the curves in Figure 1 illustrate the decadal growth rate of the variables shown in Table 1 viz. a, b, c, d, e and f. These curves are drawn using the time-series forecasting method of least square regression equation: \( Y = a + \beta(t) \). The computed trend values are presented in Table 2 and are also illustrated in Figure 1.

Table 2: Trend Values of Selected Variables

<table>
<thead>
<tr>
<th>Year</th>
<th>a</th>
<th>b</th>
<th>C</th>
<th>d</th>
<th>e</th>
<th>F</th>
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<td>1960-61</td>
<td>1.0721</td>
<td>0.2025</td>
<td>1.5326</td>
<td>1.3896</td>
<td>-0.585</td>
<td>-2.17</td>
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<td>1970-71</td>
<td>1.4805</td>
<td>0.2081</td>
<td>2.0656</td>
<td>1.9698</td>
<td>1.2538</td>
<td>-0.17</td>
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<td>1980-81</td>
<td>1.8869</td>
<td>0.2137</td>
<td>2.5986</td>
<td>2.55</td>
<td>3.0926</td>
<td>1.83</td>
</tr>
<tr>
<td>1990-91</td>
<td>2.2943</td>
<td>0.2137</td>
<td>3.1316</td>
<td>3.1302</td>
<td>4.9314</td>
<td>2.83</td>
</tr>
<tr>
<td>2000-01</td>
<td>2.7007</td>
<td>0.2081</td>
<td>3.6646</td>
<td>3.7104</td>
<td>6.7702</td>
<td>2.219</td>
</tr>
<tr>
<td>2010-11</td>
<td>3.1091</td>
<td>0.2025</td>
<td>4.1976</td>
<td>4.2906</td>
<td>8.0926</td>
<td>1.608</td>
</tr>
<tr>
<td>2020-21</td>
<td>3.5165</td>
<td>0.1969</td>
<td>4.7306</td>
<td>4.8708</td>
<td>10.4478</td>
<td>0.997</td>
</tr>
</tbody>
</table>

Source: Computed from Table 1.
Figure-2: Best-fit-line trend value of Selected Variables

Co-efficient of Correlations: Using Karl Pearson’s method ( \( r = \frac{\Sigma \Delta a \Delta b}{\sqrt{\Sigma a^2 \Sigma b^2}} \) ), we find correlation co-efficient between independent variables (b, c, d, e, and f) and dependent variables (a). The co-efficient values and their square-up values are shown in Table 3.

**Table 3: Correlation Co-efficient Values**

<table>
<thead>
<tr>
<th>Correlation between variable-a and variable-</th>
<th>r-value</th>
<th>r²-value</th>
<th>I - r² value</th>
</tr>
</thead>
<tbody>
<tr>
<td>b=(r₁)</td>
<td>-4.0009</td>
<td>16.0073</td>
<td>-15.0073</td>
</tr>
<tr>
<td>c =(r₂)</td>
<td>1.2933</td>
<td>1.6726</td>
<td>-0.6726</td>
</tr>
<tr>
<td>d=(r₃)</td>
<td>1.2078</td>
<td>1.4588</td>
<td>-0.4588</td>
</tr>
<tr>
<td>e=(r₄)</td>
<td>0.8686</td>
<td>0.7545</td>
<td>0.2455</td>
</tr>
<tr>
<td>e=(r₅)</td>
<td>-0.1687</td>
<td>-0.0284</td>
<td>1.0284</td>
</tr>
</tbody>
</table>

Source: Table-1

**Multiple Correlation Co-efficient:** On the basis of table-3 the Multiple Correlation Co-efficient of a, b, c, d, e and f variables are computed by using the method as:

\[
r_{a,b,c,d,e,f} = \sqrt{1-(1-r_1^2)(1-r_2^2)(1-r_3^2)(1-r_4^2)(1-r_5^2)}
\]

\[
= \sqrt{1-(1 - 16.0073)(1-1.6726)(1-1.4588)(1-0.7545)(1-(-0.0284))}
\]

\[
= \sqrt{1- (-15.0073*-0.6726*-0.4588*0.7545*1.0284)} = -1.169
\]

\[r_{a,b,c,d,e,f} = 1.08\]
Since the computed value is 1.08, there is positive relation between dependent variable—a (GND) and independent variables—b, c, d, e and f.

5.0 Findings

The trends of past economic growth initiated by growth models from time to time in India tells the truth behind facts and also enable us to estimate future growth trends with problem-solving suggestions.

(i) Rising GNP Growth Rate: At 2004-05 prices, the GNP of India has been increased by average 1132.25% per annum during 1951-52 to 2010-11 (GNP=71851.59-105.61/105.61*100/60= 1132.25). Meanwhile, population, GDS, GDI, HDI and NCI have been increased by 3.75%, 4094.56%, 3790.79%, 3883.51% and 1659.20% respectively. The curve-a, in figure-2, shows the rising GNP growth rate trend. Based on estimated trend value, to find-out estimated GNP for 2020-21 (Yt+1), the following equation is used:

\[ Y_{t+1} = (k_{t+1} \times Y_t) + Y_t \]

Substituting the values: \( Y_{t+1} = (3.1091 \times 71851.59) + 71851.59 = \text{Rs}295245.37 \text{ crore} \).

Thus, India’s GNP at 2004-05 prices may increase to Rs295245.37 crore in 2020-21.

(ii) Economic growth has lowered the population growth rate in India: The decadal population growth rate has been remained lower to the decadal GNP growth rate and the gap between the two has been widening; it is shown as ‘curve-a’ and ‘curve-b’ in figure-1. The population decadal growth rate increased from 0.1836 in 1960-61 to 0.2551 in 1980-81 but it started gradually declining to 0.2356 in 1990-91 and 0.1639 in 2010-11. Initially the population policy including family planning program and later the impact of improvement in economic position of the people have lowered population growth rate; the decline in population decadal growth trend is shown by curve-b in figure-2. Based on estimated trend value, to find-out estimated GNP for 2020-21 (Pt+1), the following equation is used:

\[ P_{t+1} = (k_{t+1} \times P_t) + P_t \]

Substituting the values, \( P_{t+1} = (0.1969 \times 1186) + 1186 = 1419.52 \text{ billion} \).

Thus, India’s population may increase to 1419.52 billion in 2020-21. Malthusian theory has failed to convert economic growth into population growth.

(iii) India’s GDS (S) shows a rising trend: The decadal GDS growth rate has remained higher than the decadal GNP growth rate and the gap between the two has been widening in recent years (shown as ‘curve-a’ and ‘curve-c’ in Figure 1). The GDS decadal growth rate has increased from 0.9768 in 1960-61 to 4.0548 in 1990-91 but it has started declining gradually to 2.8357 in 2000-01 and once again increased to 4.1439 in 2010-11.
However, the ‘best-fit-line’ is drawn on the basis of values of variable-c, which is shown in the table-2 and curve-c in figure-2. Using equation \( S_{t+1} = (k_{t+1} \times S_t) + S_t \), we find estimated GDS for 2020-21 (\( S_{t+1} \)).

Substituting the values, \( S_{t+1} = (k_{t+1} \times S_t) + S_t = (4.7306 \times 26519.34) + 26519.34 = Rs. 151971.73 \) crore.

(iv) India’s GDI (I) shows a rising trend: The decadal GDI growth rate has remained higher than the decadal GNP growth rate and the gap between the two has been widening in recent years (shown as ‘curve-a’ and ‘curve-d’ in Figure 1). The GDI decadal growth rate has increased from 1.0285 in 1960-61 to 4.3202 in 1990-91 but it has started declining gradually to 2.4619 in 2000-01 and once again increased to 4.4357 in 2010-11.

The equation \( I_{t+1} = (k_{t+1} \times I_t) + I_t \) is used to find-out estimated GDI for 2020-21 (\( I_{t+1} \)). Substituting the values: \( I_{t+1} = (4.8708 \times 28716.49) + 28716.49 = Rs. 168588.77 \) Crore; thus, India’s GDI is expected to increase to Rs 168588.77 crore in 2020-21.

(v) A continuous hovering trend in human capitalisation investment: The decadal HCI growth rate has remained higher than the decadal GNP growth rate and the gap between the two has been widening in recent years (shown as ‘curve-a’ and ‘curve-e’ in Figure 1). It had hovered between the ranges 0.3073 to 10.8808, which indicates that there is no definite trend.

To find-out estimated HCI for 2020-21 (\( H_{t+1} \)), the equation \( H_{t+1} = (k_{t+1} \times H_t) + H_t \) is used.

Substituting the values: \( H_{t+1} = (10.4478 \times 69467.6) + 69467.6 = Rs. 795251.19 \) crore; India’s human capital formation may increase to Rs 795251.19 Crore in 2020-21.

(vi) A continuous increase in natural capital investment: The decadal NCI growth rate has remained higher than the decadal GNP growth rate till 1990-91 but started declining thereafter remaining below it. The gap between the two has been widening in recent years (shown as ‘curve-a’ and ‘curve-f’ in Figure 1). To find-out estimated NCI for 2020-21 (\( N_{t+1} \)), the equation \( N_{t+1} = (k_{t+1} \times N_t) + N_t \) is used.

Substituting the values: \( N_{t+1} = (0.997 \times 1694.09) + 1694.09 = Rs. 3383.1 \) crore; India’s natural capital formation is expected to increase to Rs 3383.1 crore in 2020-21.

(vii) Inclusive Economic Growth Rate (IEGR): To measure inclusive economic growth rate, I have developed the formula as “Number of Factors (denoted by ‘n’)*(change in GNP or \( \Delta Y/Y \))/change in Value of Factors (denoted by ‘F’)*100/Year (denoted by ‘t’) i.e. \( \text{IEGR} = \frac{G}{t} = \frac{n \times (\Delta Y/Y)}{F \times 100/t} \). Based on decadal growth rates of macroeconomic variables computed in Table 1, by using this new formula the average annual growth rate of India’s GNP in terms of each and all factors is computed in Table 4.
In Table 4, the time-period is shown in column (1), GNP growth in terms of population in column (2), in terms of investment in column (3), in terms of human capital investment in column (4), in terms of natural capital investment in column (5) and inclusive economic growth rate in column (6). Since GDS and GDI have the same trend, only GDI has been taken into account. Table 4 shows that India’s decadal inclusive economic growth rate was single digit and was hovering between 6.45% to 9.8% during 1951-1991 but it reached 14.36% during 1991-2001; this clearly states that Nehru-Mahalanobis Growth Model (endogenous growth model or closed economy model) had initiated the rising trend economic growth during 1951-1991 but Narsimhrao-Manmohan Singh Growth Model (exogenous growth model or open economy model) took the economic growth rate to double digit during 1991-2001 by opening Indian economy to globe through new economic reforms. The global great recessions and domestic inflationary situation reduced the decadal growth rate to 6.73% during 2001-2011. However, the present growth model ensures 8.52% decadal inclusive economic growth rate during 2011-2021 i.e. Gi_{2011-21} = n (∆Y/Y)/ F*100/t =4*3.5165/16.5125*100/10=8.52%. [Gi = Inclusive Economic Growth, n = 4 variables (b, d, e, f), F= Value of b+d+e+f, t= ten year period].

(viii) Inclusive Growth Rate is more than simple growth rate: In Table 4, simple growth rate is shown in column 3 and inclusive growth rate in column 6; simple growth rate is in terms of investment, as per traditional way, but inclusive growth rate is in terms of...
population, investment, human capital and natural capital; hence it is a more appropriate measurement. In case of India’s economic growth rate, inclusive growth rate is higher than simple growth rate but during 1961-91 simple growth rate had declining trend whereas inclusive growth rate had increasing trend; this means that the simple growth rate did not represent the growth initiated by declining population growth, increasing human and natural capital growth which the inclusive growth rate represents.

5.0. Conclusion

It is observed from the analysis that the GNP of India increased from Rs. 105.61 crore in 1951-52 to Rs.71851.59 crore in 2010-11 at 2004-05 prices. Moreover, when we compute its decadal growth rate, initially it increased from 0.6075 in 1960-61 to 2.8217 in 1990-91 but it declined gradually to 2.6325 in 2010-11. This means that GNP of India, at 2004-05 prices, increased gradually, and had upward trend, during 1951-52 to 1990-91; it shows Nehru-Mahalanobis Economic Growth Model (NMEGM) worked successfully to place Indian economy on growth track. The period from 1950 to 1980 was crucial for the Indian economy because it witnessed strong economic policies, programs and measures such as industrial policies, land-reforms, public sector growth, controlled expansion monetary policies, budgetary policy, social control, population policy, and export or peril trade policy. However, GNP decadal growth rate started declining from 1990-91. The post economic reforms NMSEGEM theory of economic growth, initiated during 1990s, attracted more foreign capital initially but failed to achieve expected growth in agriculture and industrial sectors; the service sector, no doubt, has raised its share in GNP. Meanwhile, Indian rupee became cheaper against US dollar, Britain pound sterling and other foreign currencies. Thus, the GNP decadal growth rate start declining; but when we take economic growth in terms of population, capital investment, human and natural capital investment it was higher during 1991-2001 (14.36%). This was because of the opening of Indian economy, implementation of new economic reforms and service sector growth in the fields of Information Technology and Bio Technology (ITBT). The global recession of the first decade of 21th century adversely affected the Indian economy which lowered the inclusive economic growth during 2001-2011. However, it recovered to a higher rate (8.52%) during 2011-2021. Moreover, it indicates that Indian economy has the self-sustaining growth mechanism, initiated by early plans and development programs that could maintain its growth rate at more than 5% always, even in adverse conditions.
While measuring economic growth we use model or methods such as \( G = \frac{\Delta Y}{Y} \times 100 \) or \( G = \% \) of gross domestic investment/capital-output ratio (GDI%/K/O) but there is a need for including the impact of population, human capital investment and natural capital development. This study suggests a new method known as ‘inclusive economic growth method’ i.e., \( G_i = \frac{n (\Delta Y/Y)}{F} \times 100/t \) to compute economic growth rate because it takes care of both accumulation of wealth by globalised trade and maintenance of healthy environment for the living-beings on earth.

In conclusion, the economic growth rate measured in the form of change in gross national product does not give an inclusive picture of the real growth in terms of wealth accumulation and protection of environment. Increasing productivity through investment in development of infrastructure, technological up-gradation at the cost of environment that creates unhealthy atmosphere environmentally, socially, economically and politically is not economic growth; in true sense, it would be increasing productivity along with protection and development of natural resources and environment. The inclusive growth measurement helps to assess the growth in this true sense.

References


**Reports**

