CHAPTER I

INTRODUCTION

1.1: INTRODUCTION AND CONCEPT

Economic growth is the rate of increase in annual total production of goods and services in a country, leading to a rise in National Income. Earlier, the development of a country was measured only in terms of gross domestic product and subsequently per capita income became an important indicator. But, in late twentieth century, a new development concept known as human development has evolved in the history of economic literature.

The human development concept does not deny the importance of economic growth and wealth accumulation for the welfare of society. However, it claims that economic growth is though necessary; it is not a sufficient condition for human well-being. The United Nation Development programme (UNDP) rightly asserted that “people are the real wealth of the nation, so the basic purpose of development is to enlarge human freedoms”.1 Even before great wealth is accumulated, major improvement in the quality of life is possible. Human development is pro-poor, pro-nature, pro-jobs, pro-women and pro-children, enlarging people’s choices, opportunities and enables them to participate in decision-making that is affecting them.2 The human development is a concept much broader than the conventional theories of economic development (per capita income).3 It is the end, while the tributaries are the means; but human development can also acquire ends’ characteristics. It has to do with mental health, self-esteem, success in significant relationships and happiness.

A society does not have to be rich to be able to afford democracy. A family does not have to be wealthy to respect the rights of each member. A nation does not have to be affluent to treat women and men equal. Wealth facilitates the development of human aspects, but it is not the only significant factor for the welfare of human beings. Many countries have high Gross National Product (GNP) per capita, but low human development indicators and vice versa, while countries at similar levels of GNP per capita may have different human development indicators. Also, maximisation of wealth and enrichment of human lives need not move in the same direction as

many human choices extend far beyond economic well-being. Knowledge, health, a clean physical environment, political freedom and simple pleasures of life are not exclusively dependent on income.  

Human beings are the agents, beneficiaries and adjudicators of progress, but they also happen to be directly or indirectly the primary means of all production. The process of development has to expand human capacities by expanding the choices that people have in order to live full and creative lives. Human development has two facets: one is the formation of human capabilities such as health, knowledge and skills. The other is the ability to use these acquired capacities for productive, economic purposes and for being active in cultural, social and political affairs. There may be growth and development, advancement and realisation of potential available resources, but no resource is more potent than people empowered by confidence in their value as human beings.  

Income helps people to realise valuable ends and fulfill many aspirations. It enables people to gain access to many goods and services, which potentially improve the quality of life. But higher income is not the only achievement that people cherish and value. For example, level of environmental pollution, safety, crime and domestic violence, the quality of education and health care may not be necessarily associated with levels of income in any predictable manner.  

The acquisition of knowledge, the need to lead a long and healthy life and the need to have access to resources required for a decent standard of living have been identified as three essential choices for the attainment of human development. Further, additional choices that are valued by people include political, economic and social freedom, opportunities for being creative and productive, enjoying personal self-respect and guaranteed human rights. Hence, ‘human development is the end, economic growth is the means: so the purpose of growth should be to enrich people’s live’.  

There is a growing realisation of the importance of human development. As plant and machinery and other physical assets are important instruments for production, so is human

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development important for production of goods and services. A nation may possess abundant inexhaustible natural and physical resources, necessary machineries and capital equipments, but unless there are people who can mobilise, organise and harness the nature’s bountiful resources, a country or state cannot make rapid strides towards economic advancement.\footnote{Somvanshi, Vanita (2006): “Empowering Child Labourers Through Education; Hope and Despair” in S.K. Pant (ed), \textit{Human Development: Concept and Issues in the Context of Globalization}, Rawat Publication, New Delhi:189-191}

The purpose of development policy, therefore, is not necessarily to maximise economic growth (GNP) alone, but to establish a balance between growth in income, on one hand, and social equity, environment quality and public participation in a democratic setting, on the other.\footnote{MHHDC (2002): \textit{Human Development in South Asia}, Oxford University Press, Karachi: 192}

Hence, human development is a process of widening choices and improving human well-being.\footnote{Kaul, Inge (2005): “Choices that Shaped the Human Development Reports” in Fukuda-Parr and Shiva Kumar (eds), \textit{Readings in Human Development}, Oxford University Press, New Delhi: 86}

In recent years, considerable attempts have been made to understand the dimensions of economic growth. Understanding the causes and nature of differences in levels and growth of income across the regions (countries) becomes important as even a small difference in the growth rates, if accumulated over a long period of time may have substantial impact on standards of living of people (Barro and Sala-i-Martin, 1995).\footnote{Barro and Sala-i-Martin (1995): “Capital Mobility in Neo-Classical Models of Growth”, \textit{American Economic Review}, 85, March: 103-115.}

Another major shift in development thinking came as a result of the experience of the industrialised countries that the regional disparity has become a global phenomenon. Fisher (1913) has rightly stated that an economic growth could take place together with social ills, such as misdistribution of income, although undesirable. The economic development since Second World War (WWII) has been a spectacular, unprecedented and unexpected success.\footnote{Streeten, P (2003): “Shifting Fashion in Development Dialogue, 2003” in Parr and Kumar (eds), \textit{Readings in Human Development}, Oxford University Press. New Delhi.} However, at all levels of development the regional disparity continues to be the major concern in planning strategies, especially developing countries.\footnote{Shiva Kumar, A K (1996): “UNDP’s Gender-Related Development Index, A Computation of Indian States”, \textit{Economic and Political Weekly}, Vol 31(14), April 6: 887.}

There has been an unfair and inequitable distribution of wealth around the world: 20% of the world’s population consume 86% of the total world goods.\footnote{UNDP (1998): Human Development Report, Oxford University Press, New York.} There has been increase in diversity of growth among developing countries and increase dualism within many of them. Despite high rate of economic growth, not enough employment...
has been created for the rapidly growing labour force. In this regard, Sen has stated that “A society can be Pareto optimal and still be disgusting”.  

Kuznets (1955)\(^{18}\) and Williamson (1965)\(^{19}\) claimed that the regional disparities increase in the early stages of economic development due to an uneven spatial coverage of technological progress. The regional disparity therefore, follows the so called “inverted U-shaped”. The privileged position of more developed areas in terms of capital and labour mobility get better advantage in its growth. Thus, the gap would continue unless de-agglomeration effects take place due to diseconomies.\(^{20}\)

The neo-classical economists postulated that the disparity is a passing phase and that the market forces would ensure the returns of all factors of production to marginal products. It is argued that the regional disparity is temporary as the initial unbalance growth of an economy would be neutralised through trickle down effect.\(^{21}\) The regional disparities in terms of supply and demand for factors of production will be removed, given the sufficient mobility of production factors and commodities.\(^{22}\) There is an opinion that the development can start only in a relatively few dynamic sectors and geographic locations from where it is expected to spread to the remaining sectors and geographical areas of a country.\(^{23}\) Several studies have predicted that if the economies are similar in technology, taste and preferences, then the lower the initial level of per capita income, the higher is the growth rate of per capita income (Barro and Sala-i-Martin 1991\(^{24}\), Charteji 1992\(^{25}\), Cashin 1995\(^{26}\)).

In India, the regional disparity in early post-independence period declined, but in the mid sixties, particularly in the wake of Green Revolution, disparities started mounting.\(^{27}\) Since then, there is no evidence of absolute or conditional convergence in economic development across the

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states in India.\textsuperscript{28} The disparity particularly in PCI does not show any significant decline in regional disparity, rather it has widened with economic reforms in the country.\textsuperscript{29}

There is a concern in the development process of a nation that the \textit{gender disparity} has become prominent around the globe. Men and women live under the same roof, but they follow distinct life styles. They do not share the same condition of living and privileges. An invisible contract between the two always exists.\textsuperscript{30} Women are generally assigned vulnerable job especially the task of unpaid kitchen work, particularly in cooking. They play physically demanding and important role in building up a society.\textsuperscript{31} Moreover, women carry out most of the agricultural activities.\textsuperscript{32} Yet, they are treated as “second sex”\textsuperscript{33} and still striving to be not less than equal.

Many tasks of the housewives have alternate market prices as every housewife performs work in the economic sense of the term, irrespective of the fact of direct payment. The famous statement of Alford Marshall about housemaid and the housewife is pertinent here. Most part of a woman’s work at home is economic in nature. The real income is generated in the household by several tasks, but this could not find its way into the national income estimates due to its operational limitations.\textsuperscript{34} Therefore, female contribution in the process of development have been realised lately.

There are literature arguing that increase participation of women in the low-skilled labour market is often accompanied by reduction of male participation.\textsuperscript{35} Also, increase in male child enrolment and increase in female drop out at secondary and tertiary education are the reasons behind increasing gender gap. The new capital-intensive production process employs higher skilled men, while women are stuck in the low-skilled export sector which is more of short-run. Hence, these factors increase gender gap.\textsuperscript{36}

\begin{thebibliography}{99}
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In late 20th century, the development concept has been shifted to broad human development, yet, there still exist close relationship between economic growth and human development. Economic growth provides resources to achieve improvements in human development while improvement in human development plays a significant role in achieving economic growth. Thus, there is a casual connection between economic resource base and human development achievements of a State, but these connections are “not automatic”.

During the 1980s, several authors proposed a variety of “new growth theories”. In this framework, the long term growth is determined not by exogenous of technical progress alone, but also by the behaviour of people responsible for accumulation of productive factors and knowledge. These have bearing on the relation between economic growth and human development.

The two-way linkages between economic growth and human development can be easily conceived from both theoretical and empirical evidences. Growth acts on human development mainly through two routes; firstly, household activities like the unpaid works done by women such as managing the household, raising children and caring for elderly and the sick. Secondly, increase in public spending on social sector activity enhances human development. An increase in public spending for infrastructure like road connectivity will lead to an improvement in health and better educational facilities. It will also add to higher income, and hence better human development.

Economic growth is the most effective force in the history of development as its effects spread over the generation. Study has shown that women in poor households are less likely to receive antenatal care and to have their births attended by untrained medical assistants. Their children are less likely to survive or to complete schooling. Children who do not complete schooling are more likely to have lower income. Hence, the cycle of deprivation is transmitted across generations. The knowledge paradigm thus needs to be human development and capability theory, not human capital theory.

Income is an important means of enlarging people’s choices as it leads to higher spending on people’s health and acquiring knowledge. Subsequently, healthier and better knowledge can

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be more productive and can have greater access to opportunities to improve their lives.\textsuperscript{43} Thus, expenditure (both public and individual) on human development inputs viz; education, health, sanitation, drinking water, etc. constitute strong instruments of improving human well-being (Deolalikar, 1993\textsuperscript{44}; Thomas 1990\textsuperscript{45}).

Studies showed that at macro level, the distribution of the increased income from economic growth will also have a strong impact on human development. It is also found that poorer households spend a higher proportion of their income on goods which directly promote better health and education than those with higher incomes. At the micro level, household’s propensity to spend in something that can contribute to the promotion of human development depends on level and distribution of income across households as well as on who controls the allocation of expenditure within households.\textsuperscript{46}

The advent of “endogenous growth models” made the concept of capital to include knowledge and human capital.\textsuperscript{47} These models suggest that educated and skilled manpower is not only more productive, but also more efficient in uses of capital and technology. The core of endogenous growth theory is that human capital and research and development are important determinants of marginal product of (generalise) capital and remain constant rather than diminishing as in the case of neoclassical theories.

There are evidences that education plays an important role in advancing economic growth.\textsuperscript{48} Improvement in human development due to improvement in education, nutrition and health of people advances economic growth by enhancing their capabilities and efficiency in agriculture (Lucas, 1988\textsuperscript{49}; Romer, 1990\textsuperscript{50}). Improvements in health and nutrition have also found to be positively associated with labor productivity, especially among poorer individuals (Schultz 1988\textsuperscript{51}, Behrman 1993\textsuperscript{52}, 1996\textsuperscript{53}). In agriculture, there exists a positive effect of education on

\footnotesize{\textsuperscript{43} Mahbub ul Haq Human Development Centre (2002): \textit{Human Development in South Asia}, Oxford University Press, Karachi. 
\textsuperscript{44} Dholakia, R H (2003): “Regional Disparities in Economic Growth and Human Development in India”, \textit{Economic and Political Weekly}, Vol. 38 (39), September, 27: 4166-4172 
\textsuperscript{47} Developed by Paul Romer (1986), Lucas (1988) and Rebelo (1991) 
productivity among farmers by using modern technologies.\textsuperscript{54} Studies have shown that farmers with four or more years of schooling in Thailand are likely to be three times higher in adopting fertilisers and other modern input than less educated farmers.\textsuperscript{55} It is argued that the growth of labour productivity in agriculture is strongly determined by the level of health and nutrition.\textsuperscript{56}

Education, especially female education has led to many social benefits, such as improvement in the standards of hygiene, reduction in infant and child mortality rates and decline in population growth.\textsuperscript{57} For instance, countries like Kenya, Botswana and Zimbabwe have the highest number of female schooling among African countries; as a result they are lowest in child mortality rates. Human development is thus, the \textit{means} as well as an \textit{ends} in themselves.

1.2: \textbf{STATEMENT OF THE PROBLEM}

The primary focus of developmental planning is to ensure the high growth of the economy and equitable development between regions, individuals and genders in the State or the Country. However, despite all the good intentions in planning strategies, the regional disparity has become a world-wide phenomenon, where the developing countries suffer the most. In India, there are evidences that regional disparity has widened during the era of centralised planning. Measures adopted were rather ad hoc and were influenced by political pressure groups. The trend of regional disparity would continue if no innovative strategy is adopted in low performing region.\textsuperscript{58} The regional disparities in the level of development reflect resource flow biasness towards some favoured region. This leads to differences in accessing social services, basic infrastructure and opportunities.\textsuperscript{59} India is one of the countries facing the dilemma of economic efficiency versus social and regional equality of development,\textsuperscript{60} whereby there is no exception, particularly in Nagaland.

\begin{thebibliography}{99}
\item Behrman, J R (1993): “The Economic Rationale for Investing in Nutrition in Developing Countries”, World Development, Vol. 21
\end{thebibliography}
In Nagaland, there is concern for inter-district inequality in the development of the state. This has been expressed in government’s policies and planning since its Statehood. Hence, out of 16 major tribes in the State, nine tribes are recognised as backward, namely Chakhesang, Chang, Khiamuingan, Konyak, Phom, Pochury, Sangtam, Yimchunger and Zeliang. Therefore, special attention and privileges have been given to these regions in budget allocation and employment policies.

The State, in general, has progressed in several aspects of economic and human development. Yet, the extent of inter-district disparity, income inequality and gender disparities are still matters of concern. The relatively less developed districts such as, Mon and Tuensang (including Longleng and Kiphire) are unable to catch up with the rest of the districts particularly in terms of education, income and infrastructure. Consequently, this has reflected in their poorer performance of economic as well as human development. The NSHDR 2004 showed that the HDI value was highest in Dimapur with 0.733, followed by Mokokchung (0.705), Kohima (0.673), Wokha (0.669), Phek (0.651), Zunheboto (0.611), Tuensang (0.512) and the lowest was Mon with 0.450. This indicates that there exists inter-district disparity in human development indicators in Nagaland. Also, the same report provided that the highest per capita income district Dimapur has 3.8 times higher than that of the lowest Mon. Hence, it shows that there is development deficit particularly in Mon and Tuensang districts, which is one of the causes of social unrest leading to the demand for a separate Statehood, the so called “Frontier Nagaland”.

Although, there is no open discrimination against women in Naga society, the disparity between the genders is evident, especially in terms of political and socio-economic activities. This is one of the obstacles towards enhancing human development in the State. Further, there is no study on the nexus between economic growth and human development in the context of Nagaland. Hence, it is felt imperative to examine on these issues so as to assist in formulation of future strategies in planning and to ensure equitable development in the State.

1.3: Objectives
The present study attempts to analyse the following:
1) To examine the socio-economic conditions of Nagaland.
2) Sector-wise development and sectoral growth of the economy in Nagaland.
3) The inter-district disparity in economic and human development indicators, income distribution and gender disparities in Nagaland.
4) Government and Households’ expenditure pattern on Human Development related

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Items (HDrIs).

5) Two-way linkages between economic growth and human development.

6) Relationship between female education and human development.

1.4: HYPOTHESES

The study postulates:

1) There is no tendency to converge in inter-district disparity in development, level of income and gender disparities over time in Nagaland.

2) The higher the level of average income, the lower is the extent of inequality and vice versa.

3) The impact of additional income on expenditure in HDrIs is higher in lower than in higher income households, and when female control the household income, the expenditure towards HDrIs tends to be higher.

4) There are two-way positive linkages between economic growth and human development.

5) Female education has positive impact on human development.

1.5: AREA OF THE STUDY

Nagaland covers an area of 16,597 Sq. Km with a population of 19,80,602, out of which, 71.03% lives in rural area. According to 2011 census, the State has eleven districts, mostly inhibited by tribal population having similar socio-economic conditions. Keeping in mind all the common features of development, habits and social life of the people, the present study covers the State of Nagaland. In the analysis, the newly created districts namely, Longleng, Kiphire and Peren are included in the former districts as their required time series data are not available. At macro-level study, all the districts (eight) are taken into consideration in sector-wise analysis. At micro-level, three districts are selected as sample districts, namely Mokokchung, Phek and Tuensang. From each selected district, two villages and their respective headquarters are selected to represent sample rural and urban areas.

1.6: PERIOD OF STUDY

The analyses of sector-wise growth and inter-district disparities have covered the period 1991-2006 at four different points of time with five yearly intervals, i.e. 1991, 1996, 2001 and 2006. In sectoral growth of the State’s economy, the study has covered the last twenty five years i.e. 1981-2006 on annually basis. The testing of two-way linkages at macro-level is taken for the

62 Census of India 2011.
period 1971 to 2011; while at micro level, it is taken a single time period, based on the sample survey conducted during 2009-10.

1.7: SCOPE OF THE STUDY

The study throws light on the socio-economic conditions of Nagaland which have bearing with direct relation to enhancement of people’s well-being. The study brings out the inter-district relative growth rates in indicators of the State’s economy and human development in different sectors such as agriculture, industry, infrastructure, education and health. The study also provides the magnitude of inter-district variation in indicators of economic growth and human development, income inequality and gender disparities. It also empirically examined the inducements from economic growth to human development and vice versa at macro as well as micro levels. Furthermore, the impacts of female education on economic and human development have been explored. Hence, this study will provide a reliable source that will assist the policy planners while formulating effective policies for uplifting the standard of living, reducing regional and gender disparities; and enhancement of economic growth and human development for the state of Nagaland.

1.8: METHODOLOGY OF THE STUDY

1.8.1: Data Base: The study is based on both secondary and primary sources. The secondary data are collected from a variety of authentic government and other sources available in published and unpublished forms, such as statistical handbooks, census reports and official records. The primary data are collected by conducting a stratified random sample survey using questionnaire and direct interview methods. The sample survey has been conducted during 2009-10.

1.8.2: Sample Design: In the first stage, districts are stratified into relatively more developed (Dimapur - 0.733, Mokokchung - 0.705 and Kohima - 0.673), moderate (Wokha - 0.669, Phek - 0.651 and Zunheboto - 0.611) and less developed (Tuensang - 0.512 and Mon - 0.450) on the basis of HDI values 2001.

In the second stage, one district from each of the stratum is selected viz; Mokokchung, Phek and Tuensang respectively. Mokokchung district is inhabited by Ao tribe, Phek by Chakhesang and Pochury and in Tuensang district, it has inhabited by Chang, Khimiungan, Sangtam and Yimgunger. According to NSHDR 2004, the per capita income for Mokokchung district was Rs. 12,305/-, while that of Phek and Tuensang were Rs. 9,880/- and Rs. 8,149/- respectively. According to 2011 census, the literacy rate for Mokokchung district is 92.68%, Phek is 79.13%, while that of Tuensang is 73.70%.
Subsequently, the villages are stratified based on socio-economic conditions. Hence, two villages and one town are selected from each sample district. Accordingly, Mokokchung village, Luyong village and Mokokchung Town from Mokokchung district, Kikruma village, Enhulumi village and Phek Town from Phek district, and Tuensang village, Konya village and Tuensang Town from Tuensang district are selected.

1.8.3: Sample Size: Altogether, 525 households are taken as sample units with a total population of 2,999. Out of sample aggregate, rural area comprises of 412 households and urban area of 113 households, making the composition 78.18% and 21.52% respectively. In total sample population, Mokokchung district consists of 26.07%, Phek-41.22% and Tuensang-32.81%.

In rural area, the number of sample households taken from Mokokchung village is 99, Luyong - 40, Kikruma - 98, Enhulumi - 42, Tuensang village - 95 and Konya - 38. These households comprise of 13.2%, 15.63%, 6.32%, 20%, 7.56% and 20.43% of their respective village total households. In urban area, 24 households are taken in Mokokchung town, 58 in Phek Town and 31 in Tuensang Town. Thus, these sample units should fairly represent the universe of the study.

1.9: List of Indicators

To analyse growth and inter-district disparity at macro-level, 29 indicators are selected. The indicators are disaggregated into economic and human development under five sectors shown below

1.9.1: Economic Indicators

(i) Agricultural Sector: Land Productivity (MT/Hec) (x1), Per Capita Production (in KG) (x2), Total Cultivated Area (in Hec) per 1000 Population (x3), Percentage of Cultivated Area to Total Area (x4) and Percentage of Gross Irrigated Area to Total Cultivated Area (x5)

(ii) Industrial Sector: Number of ITC(s) per Lakh Population (x6), SSI Units per Lakh Population (x7), Employees per SSI unit (x8) and Veterinary Hospital/Dispensary per 100 Sq. Km(x9)

(iii) Infrastructural Sector: Number of Post Office(s) per Lakh Population (x10), Post Office(s) per 100 Sq. Km (x11), Bank(s) per Lakh Population (x12), Bank(s) per 100 Sq. Km. (x13), Telephone(s) per 1000 population (x14), Surfaced Road per 100 Sq. Km (x15), Road Length km per 100 Sq. Km (x16) and Per Capita Electricity Consumption (in Kwh) (x17).

63 The differences in sample representation between rural and urban areas may be justified as the population of the state is predominantly rural (82.26% rural and 17.74% urban according to 2001 census)
1.9.2: Human Development Indicators

(iv) Educational Sector: Five indicators chosen in educational sector are Literacy rate (x18), Teacher-Pupil ratio (x19), Children Enrolment ratio (x20), Schools per 1000 Population (x21) and Schools per 100 Sq. Km. (x22).

(v) Health Sector: The selected indicators in Health sector are Medical Institutions per 10,000 Population (x23), Medical Institutions per 100 Sq. km (x24), Beds per 10,000 Population (x25), Medical Officers per Lakh Population (x26), Nurses per Lakh Population (x27), Compounders per Lakh Population (x28) and Death Rate (per 1,000 population) (x29).

1.9.3: Sample Data

The data collected from sample survey include individual and household incomes, households’ expenditure pattern, gender-wise control over household income, years of schooling, agricultural productivity, adoption of improved methods in cultivation and family size.

1.10: Data Analysis

The data collected are analysed at the State, district, household and individual levels using appropriate statistical tools, such as:

1.10.1: Mean: Mean (x) is the average value of the total set of observations. It is obtained by dividing the summation of value of observations (Σx) by the number of observations (N). It is expressed as:

\[ x = \frac{\Sigma x}{N} \]

Where, \( x \) = Arithmetic Mean,
\( \Sigma x \) = Summation of value of observations.
\( N \) = Total number of observations.

1.10.2: Standard Deviation: The Standard Deviation is also known as root mean square deviation for the reason that it is the square root of the mean of the squared deviation from arithmetic mean. A smaller standard deviation means greater degree of uniformity of the observation. The standard deviation is denoted by the small Greek letter \( \sigma \) (read as sigma). It is represented mathematically by:

\[ \sigma = \sqrt{\frac{\Sigma fd^2}{N} - \left(\frac{\Sigma fd}{N}\right)^2} \times i, \]

Where, \( i \) is the class interval.

1.10.3: Variance: The Variance of a set of number is the square of standard deviation. It is expressed as:

\[ \text{Variance} = \sigma^2 \]
1.10.4: Coefficient of Variation: Coefficient of Variation (CV) is a relative measure of dispersion. It is the percentage variation in the mean. The greater the value of CV, the larger is the variation between the numbers of observation. It is expressed by the formula:

$$ CV = \frac{\sigma}{\text{mean}} \times 100 $$

1.10.5: Correlation: Correlation is an analysis of the covariation between two or more variables. It is the technique used in measuring the closeness of the relationship between the two variables. Thus, it is useful in determining the dependency of one variable with the other. It is given as:

$$ r = \frac{\{N \sum dx dy - (\sum dx)(\sum dy)\} \div \sqrt{N \sum dx^2 - (\sum dx)^2} \sqrt{N \sum dy^2 - (\sum dy)^2}}{\sqrt{N \sum dx^2 - (\sum dx)^2} \sqrt{N \sum dy^2 - (\sum dy)^2}} $$

1.10.6: Regression: Regression analysis is a mathematical measure of the average relationship between two or more variables in terms of the original units of the data. The variable whose value is influenced or predicted is called dependent variable and the variable which influences the values is termed as independent variable or predictor. The regression equation of y and x is expressed as:

$$ Y = a + bx $$ ……….…. ... (i)

Where, Y is the dependent variable and x is the independent variable, while ‘a’ (γ-intercept) is constant and ‘b’ (slope) is the regression coefficient.

$$ b_{yx} = \frac{\{N \sum YX - (\sum Y)(\sum X)\} \div \{N \sum x^2 - (\sum X)^2\}}{\sqrt{\sum Y^2 - a\sum Y - b\sum XY}} $$

1.10.7: Standard Error Estimate: The measure which indicates the precision of the prediction of y is based on x or conversely or how inaccurate the prediction might be is called standard error of estimates. The standard error of regression of y values from $y_c$ is given as:

$$ S_{xy} = \sqrt{\sum Y^2 - a\sum Y - b\sum XY} \div N $$

The smaller the value of standard error estimates, the closer will be the dots to the regression line and the better the estimates based on the equation of this line. If the standard error of the estimates is zero then there is no variation about the line and the correlation will be perfect.

1.10.8: t-Statistics: The $t$-statistics or $t$-distribution is a hypothesis statistical test. It is derived mathematically under the assumption of normally distributed population. It is widely used statistical analysis in testing statistical significant of difference between two sample means.

The formulaic representation of ‘$t$-statistics’ is:

$$ t = \frac{(|\bar{a} - \mu| \div S) \times \sqrt{n - 1}}{\sqrt{n - 1}} $$

Where, $\bar{a}$ = the mean of the sample,

$$ S = \sqrt{\sum(a - \bar{a})^2} \div n - 1 $$

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The t-distribution is derived mathematically under the assumption of a normally distributed population. It has the following form:

\[ f(t) = C \left( 1 + \frac{t^2}{\nu} \right)^{-\frac{\nu+1}{2}} \]

Where,

- \( t = \left( \bar{a} - \mu \right) \div S \sqrt{n} \)
- \( C \) = a constant required to make the area under the curve equal to unity
- \( \nu = n - 1 \), the number of degrees of freedom.

1.10.9: Lorenz Curve: Income inequalities in different groups have been examined with the help of Lorenz Curve. It shows the percentage of income received by \( X \) percent of population, where \( X \) varies from 0 to 100. The degree to which a Lorenz Curve line deviates from the line of equality is a measure of inequality in income distributions. The degree of this inequality at any stage is indicated by the distance from the equal distribution line.

1.10.10: Gini Coefficient: Gini Coefficient (GC) is a measure to describe the extent of inequality. It is an expression of the ratio of the area between the line of equality and the Lorenz Curve. It is expressed as:

\[ GC = \frac{\text{Area between Lorenz Curve and Diagonal}}{\text{Total Area under Diagonal}} \]

The GC value 0 (zero) indicates perfect equality and value 1 (one) indicates perfect inequality. The Gini Coefficient gives mathematical expression of the level of concentration. Although there are no clear threshold points, the value of Gini coefficient above 50 is considered to be in the high inequality category.\(^{65}\) It is expressed as:

\[ GC = \sum [(P_i - 1 \times Q_i) - (P_i \times Q_i - 1)] \]

Where, \( P_i \) is Cumulative proportion of the character, whose equality is being investigated, \( Q_i \) is Cumulative proportion of the variable which is acting as a criterion for the measurement.

1.10.11: Exponential Growth Rates: To analyse the relative growth of different sectors, exponential growth rates were calculated using the formula:

\[ Y = ae^{rt} \]

Where, \( Y \) is the growth of a particular sector as the case might be and ‘\( t \)’ is the time period and ‘\( r \)’ is the growth rate. The least square estimate of the above formula has been worked out to arrive at the exponential growth rate figures.

1.10.12: Annual Average Growth Rate: The Annual Average Growth Rate is the annual percentage change of the variable taking into consideration. It is described as

\[ Ar = \frac{(\text{Last P} - \text{First P})}{\text{First P}} \times 100 \div N \]

Where, Ar is the annual average growth rate, P is the variable and N is the number of years under observation.

1.10.13: Gender Differential (GD) Method: The Gender Differential (GD) equation is the measure used to distinguish the gender inequality in an indicator under observation.\(^67\) It is expressed as:

\[
GD = \frac{(\text{MaleP} - \text{FemaleP})}{\text{MaleP}} \times 100
\]

Where, GD is the gender differential and P is the indicator. The equation explains the disparity between the genders in percentage. It is the shortfall of females’ achievement in particular indicator (P).

1.10.14: Composite Index: The Composite Index is obtained by dividing the summation of indices to the number of observations. It is constructed based on average value of the indicators taken into consideration. An average is used in order to examine the actual growth over time. If \(I_{ij}\) is the development index of \(j^{\text{th}}\) district with respect to the \(i^{\text{th}}\) sector, then:

\[
I_{ij} = \frac{a_j + b_j + c_j + d_j + \ldots + n_j}{N}
\]

Where, a, b, c, d, … n are the value of indicators in \(i^{\text{th}}\) sector with respect to \(j^{\text{th}}\) district, and N is the number of indicators.

The next step is to define an average of the indicators in \(j^{\text{th}}\) district. This is done by taking a simple average of the chosen indicators for different sectors. The Agricultural Development Index (ADI), as the case might be, for each district will be the average value of the indicators a, b, c, d, … n of \(j^{\text{th}}\) district, i.e.

\[
I_j = \frac{\sum I_{ij}}{N}
\]

Hence, \(ADI = I_j\)

1.11: Chapterisation

The organisation of the chapters is as follows:

- Chapter I : Introduction
- Chapter II : Review of Literature
- Chapter III : Socio-Economic Profile of Nagaland
- Chapter IV : Analysis of Growth Trends in Nagaland’s Economy
- Chapter V : Inter-District Disparities in Economic and Human Development in Nagaland
- Chapter VI : Linkages between Economic Growth and Human Development in Nagaland
- Chapter VII : Findings and Conclusion