

A Conceptual Model of Rural Development Index

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Abstract— Rural Areas are deprived of basic amenities such as access to drinking water, electricity, toilets and sewage systems giving rise to unhygienic conditions in the rural areas. Lack of healthcare facility in terms of infrastructure and staff has aggravated problems of health leading to infant mortality, death of pregnant mothers, decreased average life span in rural areas. Poor quality of teaching fraternity and non availability of infrastructure are major reason for illiteracy and unemployment. Non-agricultural income such as animal husbandry, sericulture and vocational trainings that supplement the agricultural income that needs to be focused. Mechanization should be the priority in enhancing agricultural yield followed by storage and transportation facility to the market in raising agricultural income. Excessive use of fertilizers and pesticides due to lack of knowledge among farmers contribute to water as well as air pollution deteriorating the environment. The disposable income spent on cultural aspects needs to be taken into consideration in assessing the status of the rural area. There is a need to assess rural areas from five dimensions such as economic, education, health, environment and disposable income in understanding present level of development in rural areas. Cause and effect diagram is established contributing to the development of specified domains. The conceptual index is a composition of Result Index and Cause Index. This distinction aids in examining the result index to measure the current level of rural development and cause index to evaluate the process of rural development for policy makers in identifying the areas of improvement in the overall development of the rural area.

Keywords— Rural, Rural Development Index, Conceptual Model.

I. INTRODUCTION

The rural communities are tangential to the mainstream of the Indian economy have not been substantially benefited from the present growth and developments happening in the country. Even after seventy years of independence,

agriculture growth continues to be feeble, farmers are still hit by poverty, poor prefer to stay in urban slums rather stagnant villages. The rural communities do not have basic amenities like healthcare centers and schools. Rural people lack in many aspects of a modern living such as education, electricity, infrastructure, health, etc. Article 14 of the Indian Constitution provides 'Rights to Equality' so they should be given their respective rights. Effective policy making for the Rural Development (RD) is the need of hour. RD involves rebuilding of every aspect of human life that includes social, political and economic condition of human beings. RD would comprise of extension of irrigation facilities, provision for electricity, improvement in the techniques of cultivation, construction of the school building and provision of educational facilities, health care and preserving the natural environment.

1.1 Objectives

The objectives of the research are

- To identify various factors that contributes for the RD.
- To establish cause and effect among the factors that contributes to RD.
- To develop a conceptual index taking factors contributing to RD.

II. LITERATURE REVIEW

In present work various research papers have been reviewed along with various theories for developing a conceptual model of Rural Development Index (RDI).

2.1 Rural Definition

A geographical area that is located outside towns and cities is considered rural area. As stated by Srivastava (1961) an area, where the people are engaged in primary industry in the sense that they produce things directly for the first time in cooperation with nature. A town with a maximum population of 15,000 is considered rural in nature according to Erstwhile Planning Commission of India. As per National sample survey an area with a population density of up to 400 per square kilometer, villages with

clear surveyed boundaries but no municipal board and a minimum of 75% of male working population occupied in agriculture and allied activities is considered as rural area. According to this research rural area is characterized by majority of people relying on agriculture and few on non agricultural income that are deprived of basic amenities such as clean water, toilet and electricity.

2.2 Rural Development (RD) Definition

According to Agarwal (1989), "rural development is a strategy designed to improve the economic and social life of rural poor." The United Nations defines RD as a process of change, by which the efforts of the people themselves are united, those of government authorities to improve their economic, social and cultural conditions of communities in to the life of the nation and to enable them to contribute fully to national programme. RD is a process of bringing change among rural community from the traditional way of living to progressive way of living. It is also expressed as a movement for progress. Researchers have envisaged RD as "set of goals and programs to well-knit strategy, approach or even an ideology" [8]. The rising concern in rural development is due to the realization that "a systematic effort is necessary to create better living conditions in the rural area" in which majority of population of developing countries reside. As per Roghayeh Gilaninia RD is strategy to improve the social and economic life of rural poor population, because the RD objective is poverty reduction. It must be followed explicitly increasing production and productive power.

RD it is a comprehensive and multi-dimensional concept, encircling the development of agriculture and allied activities, village and cottage industries including crafts, socio-economic infrastructure, community services and facilities, along with development of human resources. As a phenomenon, rural development is an end result of transactions between various physical, technological, economic, socio-cultural and institutional factors. As a strategy, it is designed to improve the economic and social well being of the specific group of people-'the rural poor'. As a discipline, it is multi-disciplinary in nature, representing an intersection of agricultural, social, behavioral, engineering and management sciences. [13]

2.3 RD Major Wings and Strategies

According to Chandra sekhara reddy et al [11] the major wings to be considered in the RD community are Economic Perspective, Human Development Perspective, Science and Technology in Agriculture, Natural Resources and Environment Aspects, Political aspects. The development should comprise of provisions to support farmer groups in capacity building, linkage of farming community with

processor or buyers for enhancing the earnings. Provision to support agriculture related industries. Agriculture productivity enhancement to be achieved by improved seeds, bio fertilizers, pesticides and promoting organic farming. Application of high end equipment or machinery that comprises applying technology in plantation as well as harvesting of the crops that contributes to reduction in the labor cost. Analysis of agriculture trade statistics include consumption data on crops, data on control of disease, agricultural product statistics, market related information etc. Research and development for agro processing industries and establishing of farmer care centers. Along with these maintenance of clean and green villages providing all weather roads and connectivity to the urban areas.

2.4 Need for Agricultural developments and Challenges

According to D. Kumuda [15] enhancements in agriculture production brings about socio- economic ripple effects. Small farmers can better feed their families with increase in income, afford sending their children to school and avail health care facilities and also invest in agriculture activities. With all this the communities will become economically robust and tend towards more stability. Rural India is mostly dependent directly or indirectly on farming to earn their livelihood. The undisputed fact is that the various factors that contribute to RD are growth in agriculture and focus towards development of human resource in the health, education and women's empowerment. Agriculture is the only sector having a potential that can create economic growth by generating job opportunities and value additions, in taking agricultural outputs to the consumer and is also helpful in rendering support with respect to information, infrastructure, training and quality control.

As per the estimation by 2050 the rise in population will be close to 9 billion. This results into enhancement in food grain production from 70 percent to 100 percent to meet the requirements globally. Scarc resources, rising incomes and climatic variations are the major reasons that exert additional strain on agricultural productivity. The number of malnourished people in the developing world accounts to two billion and is considered to be the most serious health issue in the world. It is the single biggest contributor to infant and child mortality. The reason for focusing on agriculture is that any developments in agriculture are two to four times more effective in reducing poverty and hunger compared to any other sectors.

According to Parag Das it is the responsibility of the Government to ensure that adequate RD for developing country like India. This involves fostering the utilization of natural resources in a sustainable manner along with supply

of food and animal protein. Due to lack of access to information and knowledge that will facilitate in achieving maximum agricultural yield that drives the rural farmers to the urban centers in search of formal employment. The study infers that the educational level, size of the farm, overall production, usage of pesticides and fertilizers increase the income level of farmers and vice versa and are also statistically significant. It also suggests that the poverty, lack of capital, illiteracy, scarcity of inputs, absence of mechanization, lack of facilities for marketing agricultural products, famine, floods and drought, no thorough idea of crops that would be in demand or to be precise the absence of commercialization of agriculture sector contributes to the problems of the rural farmers [16].

Anders Ekbohm showed that material inputs to agriculture results confirm the hypothesis. Major inputs like improved seeds and fertilizers, represented by their costs, shows a positive correlation with agriculture production (significance level at 1 percent and 5 percent confidence, respectively). The positive sign of coefficient applicable to tools, manure and insecticides, is not statistically significant. The observations from field confirm that the farmers with high resource obtain higher production in terms of yield. High-quality soil conservation is another key factor that boosts the output. The total rating correlates positively and statistically significant (at 1% confidence level) with agricultural productivity. The extended statistical analysis corroborates the result, that all individual measures have positive signs. The other aspects and related factors that are potential contributors in enhancing farm productivity comprises of labour availability, which is given by the number of adult farm workers to the total labour input per farm area allocated for production of agriculture. Based on the two variables hypothesis confirms that with increase in availability of labour and labour input, respectively, will yield higher levels of productivity. This confirmation fits into a bigger picture of farm intensification - that builds on quality retention and input that are of high levels - resulting in higher output per unit area. As per the observations at a level of 10% significance is that the availability of capital, domestic animals and income from non-farm activities has a positive correlation with agricultural output. The various non-agricultural farm activities balance crop production. All these are predominant and are carried out during offseason. Profits will supplements income supporting agriculture [20].

2.5 Non-Agricultural Income

Pratap S. Birthal et al have examined the access of household to various non-farming activity and the

implications on distribution of income employing data obtained from a large-scale survey that is represented on a national level. As per the study, though agriculture is perceived as a dominant source of income among farm households but nearly 50 percent of the total income is generated from non-farm activities. The contribution of non-farm sources accounts to 44% of the income of households. The share of non-farm income declines with landholding size, but is positively correlated with total income. The nonfarm income is very important for those households with lower end of land distribution. It results into the diversification of poor households more towards low-return, low-paid non-farm activities. The income portfolio is diversified towards non-farm activities due to lesser agricultural productivity; small landholdings and additional labor force that exist among the farm households. The non-farm income sources are accessible to a small proportion of farm households and have un-equalizing effect on income distribution. The study reveals that there is a positive correlation between non-farm sources and the total income. On the contrary, it suggests that income sources between income level and farm size suggests that non-farm sector can serve as potential entry points for land-constrained farm households to enhance their income level. [21].

2.6 Education Status in Rural India

J.G. Sreekanthachari et al have mentioned that during earlier times RD was correlated with agricultural development. At present rural development concept is fundamentally different then that used to be prior to 2 or 3 decades. A desirable controlling influence is exerted by education in developing of the rural individual, family, community and society leading to reduction in poverty and controlling of unemployment. Education plays a vital role including bringing of social change, awareness about the rights among the rural community, improving living standards among individuals, employment opportunities and generation of income to rural community. The primary right of every citizen of India is Right to Education as enshrined in the Indian constitution. The condition of rural education in India is still improving, as the condition of the rural schools is still very poor, children have to move far of distances in availing of the facilities and most schools do not have provision for drinking water. Quality of Education is still poorer that needs to be improved. The teachers are not paid in par when compared with urban school teachers resulting in the absence of teachers or are unwilling to deliver quality in process of teaching. Schools in rural areas are promoted to elevate the level of education and enhance literacy in rural India. These schools in India are intended to

enhance the literacy rates in rural areas. More than 40% of India's population is illiterate as schools in rural areas are lagging in imparting quality education which can be considered as equivalent to being non-existent.

Problems faced in rural education in India are teachers working in the rural areas will have less income from their job as they are on part time basis when compared to the teachers in urban schools. Dissatisfaction of teacher with their income is the major reason for lack of proper attention to the students by the teachers. Transport facility is the biggest challenge that children face in rural areas. Lack of proper transport facilities in rural areas makes children reluctant to travel miles to attend schools.

Inadequate basic amenities such as lack of infrastructure that includes school building, furniture, drinking water, clean toilets etc. and lack of extra-curricular activities [23].

2.7 Life Expectancy (LE) and Health care facilities in Rural Area

D.N Panigrahi has mentioned that "LE is an indicator of how long a person can expect to live on average given prevailing mortality rates." Understanding technically, "it is the average number of years of life remaining to a person at a specified age, assuming current age-specific mortality rates continue during the person's lifetime." LE is "a general measure of population health and is often used as a summary, in measuring and comparing different populations for international comparisons." In public policy planning also life expectancy is used as an indicator, especially to indicate future population ageing in developed nations. It is estimated that expected length of a life and mortality rates are inversely related. LE is the expected (in the statistical sense) number of years of life remaining at a given age. The

LE of a group of individuals is heavily dependent on the care. The health care issues addressed by the government which resulted in increased LE in India are Malnutrition, High Infant Mortality Rate, diseases like Hepatitis, Poor Sanitation and no access to safe drinking water, issues pertaining to female and rural health [22].

Dr. Shridhar Kadam et al have reported that the paucity of qualified health professionals as well as workers in rural areas poses a critical challenge for health sector in India. A health workforce of adequate size, with good skill mix reaches out to all sections of population is essential for achieving a high and equitable coverage of health services. As per census of India, estimate reveals that the density of health worker includes doctors and nurses is close to 8 per 10,000 populations, which is well short of the recommended norm of 25 per 10,000 as per WHO report of 2006. The topographic distribution of India's health

workforce is disturbing. 60% health professionals practice in urban places where 28% of population resides. This urban bias is consistent across all cadres of health workers; 40% of allopathic physicians, nurses, AYUSH practitioners as well as 20% of dentists are working in rural areas. The more prominent differences can be made for female health professionals particularly in case of lady doctors. The various primary motivating factors for rural service as identified are good infrastructure both at work place and government accommodation, monetary incentives and transfer and promotion policy and transparency in all the above aspects [24].

2.8 Environmental Implications on Rural Areas

K N Ninnan et al have studied the impact of changing climate with respect to agriculture revealed that agriculture is not only susceptible to changes in climate but also inherently sensitive to climate variability. The impact of Climate change on agriculture in India affects in both the ways directly and indirectly with a negative implications on the livelihood of millions of people in India. The study confirms that the agricultural productivity is sensitive to two broad classes of climate-induced effects precipitation, temperature and CO₂ concentrations that affect the agriculture directly and indirect effects are brought about by changes in moisture content of soil, the distribution and frequency of infestation by pests and diseases. The adverse effect of Agriculture is not only by variations in the overall amount of rainfall but also because of the untimely rains. It is estimated that the loss in net revenue at the farm level is in the range of 9 and 25% with a rise in temperature of 2°C to 3.5°C.

The studies reveal that changing climate will impact the very basic elements of life around the world such as access to water, production of food, environment and the healthcare. The Indian Agricultural Research Institute study cited indicates the production loss of wheat will be 4 – 5 million tons to 1 – 2 million tons in future. It is expected that farmers have implement timely planting habits and modify to better adapted varieties of wheat. Climate change is likely to intensify the heat stress in dairy animals and adversely affect their not only reproductive but also productive capabilities. As per the study global warming will lead to a loss of 1.6 million tons of milk production in India by 2020. This can be overcome by adopting the following measures such as Population dependent on agriculture needs education and improved trainings. Present vulnerabilities of agricultural systems needs to be identified. Development of new crop varieties by way of agricultural research. Programmes on food and social security should provide insurance against changes in supplies. Integration

of the market, by providing the infrastructure, transport and distribution during the shortfall of crops. Subsidies can be withdrawn, by limiting changes in prices, masking of the climate change signals in the market place [18].

Prakash Kadave et al describe “a green village is a human settlement that enables its residents to live a good quality of life while using minimum natural resources”. It has successfully solved environmental problems including poverty, poor environmental management and wasteful production and consumption methods [25].

2.9 Theories of Rural Development

There are various theories proposed in view of the rural development the research takes into account the theories proposed in developing this conceptual research. The following theories have been considered in the development index.

1. Classical Economists Theory

This theory suggests the concept of circularity and interrelationship between technology, investment and profit. The circularity was inherent in the assumption. The level of technology is dependent on the level of investment, in turn investment is dependent on profits and further profits depend partly on the level of technology. The classical economists did not focus their attention on rural development in particular

assuming that economic growth would naturally lead to development.

2. Modernization Theory

According to this theory it offers quite a few useful insights, such as the inevitability of the use of modern technology for enhancing production in agriculture and the need for replication of traditional feudal institutions by new democratic ones in order to shift towards greater scientific temper, and secular values and norms.

3. Dependency Theory of Marxist School

This theory provides an insight in identifying the determinants of rural development, researcher should critically examine various inter-sectoral linkages taking into account both backward and forward interactions and determine whether they are beneficial to rural people or not.

4. Theory of the “Big Push or Rosenstein-Rodon”.

As per this theory, a minimum level of resources are required that must be devoted to a development programme for any change of success. A minimum quantum of investment is required, though not sufficient, condition of success. Conceptually, this paradigm continues to be appealing to planners and scholars.

5. Lewis’ Model of Economic Development with unlimited Supplies of Labour.

Lewis’s model appears to provide a good framework in understanding the process of economic development. Its basic idea is that labour productivity in agriculture must increase substantially in order to generate surplus in the form of food to be used for development of the non-farm sector and to release the surplus labour from agriculture for meeting the growing needs of the non-farm sector.

6. Human Capital Model of Development.

This model emphasizes the importance of human capital investments in the process of economic and social development. It was suggested by Theodore Schultz (1964) and he elaborated that the concept of human capital and considered explicitly the investment in human capital as an important determinant of economic development. It is most appropriate for labour-surplus developing countries like India, where a lot of underdeveloped human resources having high potential and scope for development that is existent. It substitutes human capital for exhaustible non-renewable physical capital in the process of development and thus relaxation of the constraints on development imposed by inadequacy of physical capital to a large extent. Human resource development needs to be bought about through nutrition; healthcare, appropriate education, training and empowerment deserve the highest priority in the present times.

7. Gandhian Model of RD

Gandhiji’s approach to India’s RD was holistic and focused around people. It is based on some values and premises as follows: Real India originates not in cities but in its rural areas. The revitalization of rural community is possible when the exploitation of rural community is stopped. Exploitation of villages was also a form of “violence” in according to Gandhiji. “Simple living and high thinking” that implies voluntary reduction of materialistic wants and pursuit of moral and spiritual principles of life. “Dignity of labour, everyone must earn his bread by physical labour and one who labours must necessarily get his subsistence.” Preference to the use of indigenous or “Swadeshi” products, services and institutions. Balance between the ends and means. One axiom in the 21st century should be that the human beings are both the end and the means of development.

III. RURAL DEVELOPMENT INDEX (RDI)

RDI is a dimensionless number that is calculated taking different domains into consideration. The cause and effect relationship that leads to the development of the specific domain form the basis for the index development. In the present case the index obtained can be differentiated into Cause Index and Result Index that will help in the factual

decision making for policy makers to decide on the domains that should be focused for the overall RD.

The objective of RDI is to assist the government in framing of policies and designing strategies for RD. The indices can be used in the process of decision making as the policy makers can rely on the number that helps in factual decision making as it involves numbers. The individual indices will reflect the developmental status of that particular sector and the overall development index reflects status of the rural area as a whole. The indices are developed based on the relationship between the 'Cause' and 'Result'

3.1 Concept of RDI

The index developed in this research can be used to compare the extent of development in rural places. This objective of this research presents is to assess the development of the rural areas from different dimensions. The proposed conceptual Index is composed of five domains as given below

1. Economy
2. Education
3. Health
4. Environment
5. Culture and Leisure

It is necessary to consider not only the regional economy but also domains that are closely related to the living territory of rural residents in order to accurately evaluate the level of RD. In this paper, a general index is constructed by organizing an indicator system in a way that covers all the core parts related to the living territory of rural residents to ensure that the index reflects the most common characteristics of rural residents'. The Index is composed of a 'Result Index' and a 'Cause Index.'

3.2 Cause and Effect Diagrams

The various factors that contribute to Economic, Education, Health, Environment, Culture and Leisure that are considered as indicators of RD are represented by cause and effect diagrams.

3.2.1 Agricultural Income

The fish bone diagram in the above Figure 1 depicts the various factors that enhance the annual agricultural such as Agriculture Infrastructure, Production and Distribution and are directly proportional to the agricultural income. Agriculture infrastructure includes water sources, irrigation, storage facilities which are essential requirements that supports and sustains agricultural activities. Agriculture production is dependent on land available for cultivation, capital and extent of the mechanization or the usage of modern equipments in agriculture, the availability of agriculture technology center for providing necessary

technical inputs for the farmers. The producer organizations will aid in purchasing of the agricultural output. All this will help in enhancing the agricultural production. The agriculture products needs to reach the market in proper time so storage and distribution is also one of the crucial aspects that needs to be considered, any lack of concentration will lead to the wastage of the products. There should be access to farmers in having first hand information on the price information and the type of crop that needs to be grown to enhance their agricultural income. All the above parameters are directly linked in enhancing the annual income from agricultural. The classical economist theory is the base for the interpretation as it states the concept of circularity and the interrelationship between the investment, technology and profit. According to the findings from the literature, the rural community is involved into non-farming activities in addition to agriculture. The non-agriculture activities comprise of sericulture, dairy, poultry, vocational training etc. Activities that generate income other than the agriculture falls under non-agricultural income. Agriculture is the dominant source of income among the rural community beyond any reasonable doubt but still non-farm activities also adds up to the income of the rural people. Other research findings also reveal that the non-farm income declines with landholding size, but is positively correlated with total income. This forms the basis in suggesting the fish bone diagram as shown in Figure 1. Factors Contributing to Non-Agricultural Income where in it takes into account the various sources that directly contribute to the non-agricultural income. The various aspects taken into consideration comprises of income generated by the rural people employed in agro-based industries, various enterprises and earnings from those involved in self-employment through vocational training programs. Since tourism in India is also gaining momentum as rural areas of Kerala such as Kumbalangi village and others, the income generated from it is also considered as the non-agricultural income. So the total income of the rural households includes agriculture as well as non-agricultural income. The Lewis' Model of Economic Development with unlimited supplies of Labour is the basis for this as it suggests a framework in comprehending the process of economic development for India where there is surplus labour. Its basic thought is to increase labour productivity in agriculture considerably generating surplus in the form of food to be used for development of the non-farm sector and to discharge the surplus labour from agriculture in order to meet the growing needs of the non-farm sector.

3.2.3 Healthcare

The present research considers that life LE has an indicator of the health status among the people in the rural areas. It takes into account the availability of the medical facility such as infrastructure, availability ambulance and critical medicines etc. The very important aspect here is the availability of the manpower such as Doctors, Nurses, Paramedical Staff and Pharmacists. Assessment of the health status can also be made from the disease prevention point of view such as vaccination given to new born babies, infants, pregnant and lactating mothers. Medical check-up camps also indicate the health status and the level of health education imparted by the PHC's or the panchayath or the local governance is also taken into consideration that will enhance the status of health among the rural community. As per the research findings from literature various health care issues addressed by the government that resulted in increased life expectancy in India are Malnutrition, High Infant Mortality Rate, diseases like Hepatitis, issues pertaining to female and rural health that forms the basis for the fish bone diagram as shown in Figure 1. The health status is taken into the consideration in RDI because Human Capital Model of Development as it replaces Human Resources for exhaustible non-renewable physical capital in the process of development and thus relaxation of the constraints on development imposed by inadequacy of physical capital to a large extent. It also suggests that human resource development needs to be bought about through nutrition; healthcare, appropriate education, training deserve the highest priority in the present times.

3.2.4 Education

Rural areas are deprived of basic amenities and education is one among them. Most of the schools do not have teachers in rural areas. The capacity building for teachers is necessary to enhance their competency levels. The availability of the teachers available in rural areas directly impacts the educational level. The educational facilities such as high school, college etc determines the individuals to decide on whether to continue with the further education or not. If such facilities are not available then that will lead to increase in the dropout rates as students will be reluctant in traveling a larger distance to fulfill their education. The measure taken by the rural area on campaign against illiteracy that is accounted by the no of trainers involved in training the number of illiterates. All these parameters will influence the educational level among the rural community. Education plays a vital role and is expected to bring social change, awareness about the rights among the rural community, improving standard of living in individuals, providing employment and generation of income opportunities to rural people. Human Capital Model of

Development also provides a strong base in taking education into consideration in development of the index.

3.2.5 Environment

Concern for the Environmental aspects is gaining a moment as Global warming is impacting the man-kind. The rise in the temperature of the earth due to accumulation of the CO₂ which inhibits the reflections of the solar radiations back is the major cause for Global Warming. The present research considers the natural environment or the existing environment that will comprise of Water quality, Ambient Air quality, Soil quality and the existence of any natural forest. Since the natural environment is degraded by the anthropogenic activities such activities include excessive usage of the fertilizers that pollute the surface water bodies during the run-off and bringing about eutrophication of the water sources contributing to water and soil pollution. Usage of excessive pesticides and stable burning is a major reason for contribution to air pollution. The various parameters to be examined under the residential environment are the accessibility to drinking water and electricity, availability of the toilets that would reflect on the prevailing environmental conditions of the rural area as represented by the Figure 1 aspects. Climate change will exercises its influence on Indian agriculture direct and indirectly affecting the lives as well as livelihood Indians who are relying on agriculture. Research studies reveal that climate change will have an effect on the basic elements of life around the world like production of food, access to water, healthcare and the environment. It is anticipated that as the world gets warmer people will suffer from scarcity of food grains, dearth of water and flooding in coastal areas. Gandhian Model of rural development a people centric model is the basis for taking environmental aspect into consideration.

3.2.6 Culture and Leisure

The amount of money spent on the culture and leisure aspects also will indicate the economic status of the rural community. Rural people spend mostly on the local festivals in India such as during Diwali and Ugadi time. The amount of the money spent on entertainment such as movies, fairs etc needs to be taken into account. The spending if the rural community is important as it is directly proportional to their earnings. The higher the earnings the higher will be the spending on the culture and leisure aspects and this will also reflect on the economic status of the rural community. Hence spending on culture and leisure are taken into account in RDI.

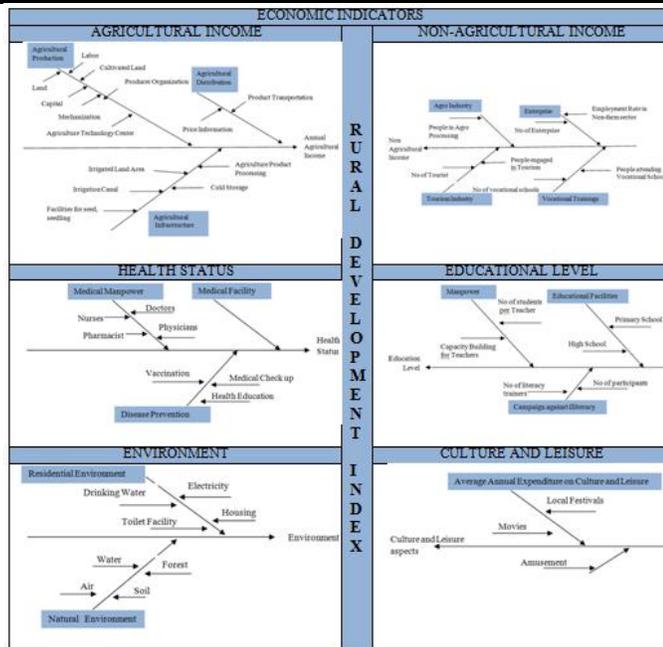


Figure 1: Conceptual Model of RDI

3.3 Calculations

The rural development takes into account the various indicators such as Economic, Education, Health Care, Environment, Culture and Leisure and converts them into indices or dimensionless numbers.

3.5.1 Economic Indicators

Farm Income=Revenue-Expenses

Expenses=∑(LandCost+Capital+Labor+Mechanization+Storage +Transportation)

Income earned from various sources such as working in enterprises, industries, tourism etc other than agricultural income is the Non-Farm Income.

Economic Indicator

Total Income=Farm Income + Non-Farm Income

Economic Index=

$$\frac{\log(\text{Total Income}) - \log(\text{Minimum Income})}{\log(\text{Maximum Income}) - \log(\text{Minimum Income})}$$

3.5.2 Health Indicators

The life expectancy is value is enhanced by the awareness, access and affordability of the health care systems prevailing in the rural areas.

$$\text{Health Index} = \frac{\text{Actual Value} - \text{Minimum Value}}{\text{Maximum Value} - \text{Minimum Value}}$$

3.5.3 Education Indicators

The education index can be calculated as follows

Education Index=

$$\frac{(\text{Mean Years of Schooling} + \text{Expected Years of Schooling})/2}{\text{Maximum Value} - \text{Minimum Value}}$$

$$\text{Education Index} = \frac{\text{Actual Value} - \text{Minimum Value}}{\text{Maximum Value} - \text{Minimum Value}}$$

3.5.4 Environment Indicators

Environment Indicators=

$$\frac{(\text{Dwelling Environment} + \text{Natural Environment})/2}{\text{Maximum Value} - \text{Minimum Value}}$$

$$\text{Environmental Index} = \frac{\text{Actual Value} - \text{Minimum Value}}{\text{Maximum Value} - \text{Minimum Value}}$$

3.5.5 Cultural and Leisure

Total disposable Income=

$$\sum \text{Income from all sources} - \sum \text{Income after tax}$$

$$\text{Culture Leisure} = \frac{\log(\text{Total Income}) - \log(\text{Minimum Income})}{\log(\text{Maximum Income}) - \log(\text{Minimum Income})}$$

3.5.6 Rural Development Index (RDI)

RDI=

$$(\text{Economic} \times \text{Health} \times \text{Education} \times \text{Environment} \times \text{Culture} \times \text{Leisure Indexes})^{1/5}$$

The present trend in calculation of indexes is the geometric mean as the variation in the performance in any dimension is directly impacted in the geometric mean. A retarded progress in any one of the dimension is no way compensated linearly by higher achievement in another domain. It reduces the level of substitutability between the dimensions. This technique of RDI calculation is widely accepted than simple average.

3.5.7 Grading System based on RDI

Based on the Rural Development Index obtained the interpretation of the rural area with respect to the development can be assessed from the values given in the Table 1.

Table.1: Grading of Rural Areas

| Classification of Rural Areas | Range of RDI |
|-------------------------------|--------------------|
| Grade A: Developed | 0.85 ≤ RDI ≤ 1 |
| Grade B: Developing | 0.70 ≤ RDI ≤ 0.85 |
| Grade C: Under developed | 0.500 ≤ RDI < 0.70 |
| Grade D: No Developments | 0 < RDI < 0.500 |

IV. CONCLUSION

The purpose of this research is to suggest a conceptual model in the process of Rural Development so that the planners and local government for designing, developing and implementing suitable strategies in the lagging domains that would ultimately lead to rural development. The research has reviewed previous studies to analyze the correlations of various factors that contribute to specific indicators. The specific indicators are then converted to indices to find out the index of those domains. Geometric mean of the various indexes will give rise to RDI. The RDI as a tool would help in evaluation of the current status and decide on the course of rural development. Policy makers can also use this index for planning of rural development

strategies and identifying particularly domains that need to be focused for the overall development.

4.1 Future Scope

The model has taken only the very basic parameters into consideration for example in case of agriculture the basic aspects of farming have been taken but one can also take into consideration the biotechnological developments, drought and disease resistant crops, tissue culture etc. Similarly in case of education the infrastructure and the manpower availability is taken but other considerations such as availability of computers, smart teaching aids etc. the same can be extended to other domains such as environment, health care for considering the Rural Development Index.

REFERENCES

- [1] Dr.C.Chandramouli, "Rural Urban Distribution of Population", Census of India-2011,15th July,2011. <http://www.censusindia.gov.in>
- [2] Selected Socio Economic statistics India 2017, Ministry of Statistics and Programme Implementation Central Statistics Office Social Statistics Division, www.mospi.gov.in
- [3] Mudit Kumar Singh, Sanitation in Rural India, International Journal of Research in Humanities, Arts and Literature, Vol. 2, Issue 5, May 2014, 19-24.
- [4] Dr. Pradeepta Kumar Samanta, "A Study of Rural Electrification Infrastructure in India", IOSR Journal of Business and Management (IOSR-JBM), Volume 17, Issue 2.Ver. IV (Feb. 2015), PP 54-59. <http://www.gramvaani.org/wp-content/uploads/2013/07/Rural-Health-Care-Towards-Healthy-Rural-India.pdf>.
- [5] <http://www.prsindia.org/uploads/media/Analytical%20Report/State%20of%20Agriculture%20in%20India.pdf>
- [6] Pratap S. Birthal et.al "Income Sources of Farm Households in India: Determinants, Distributional Consequences and Policy Implications", "Agricultural Economics Research Review" Vol. 27 (No.1) January-June 2014 pp 37-48.
- [7] Nisheeth Rai & Vijay Kumar Role of Science and Technology in making Rural India Shine IJRDMs: Volume6,Number1,January-June 2012
- [8] Roghayeh Gilaninia,"Village, Villagers and Rural Development", Singaporean Journal of Business economics, and management studies, Vol.3, No.6, 2015.
- [9] Ashish Mathur, "The Dimensions of Indian Rural Development: Issues and Challenges", International Journal of Contemporary Practices - Vol. 1, Issue. 2(June, 2011)
- [10] A.Chandra sekhara reddy et.al, "Effective Rural Development Strategies for Improvement of Indian Economy", IRACST – Engineering Science and Technology: An International Journal (ESTIJ), Vol. 1, No.1, December 2011.
- [11] Nisheeth Rai, "The role of Science and Technology in making rural India Shine", IJRDMs: Volume 6, Number 1, January-June 2012.
- [12] Singh Katar, "Rural Development Principles, Practice and Management" Sage Publications, New Delhi,(1998), pp.21-22.
- [13] Report of, "Rural Development Sector Policy Paper of World Bank", February, Washington, (1975).
- [14] Dr. D. Kumuda, "Agricultural Development in India- An Overview", International Journal of Science and Research, Vol 3, Issue 8, 2014.
- [15] Parag Das, "Problems of Rural Farmer: A Case Study Based on the Lowphulabori Village under the Raha Block Development Area of Nagaon District, Assam", IOSR Journal Of Humanities And Social Science, Volume 20, Issue 1, Ver. IV (Jan. 2015), PP 40-43.
- [16] Halim A et al, "Educational Institutional Approach for Rural Development through Distance Learning: The Experience of University of Technology in Papua NewGuinea." ahalim@ag.unitech.ac.pg/ahalim45@yahoo.com, wkerua@ag.unitech.ac.pg.
- [17] K N Ninan et al, "Climate change, Agriculture, Poverty and Livelihoods: A status report", E-mail: ninan@isec.ac.in.
- [18] Radha Garjola et al, "Analytical Study on the Technological Problems of Rural India and their Remedies", International Journal on Emerging Technologies (Special Issue NCETST-2017).
- [19] Anders Ekbom, "Some Determinants To Agricultural Productivity"
- [20] Pratap S. Birthal, "Income Sources of Farm Households in India: Determinants, Distributional Consequences and Policy Implications", Agricultural Economics Research Review, Vol. 27 (No.1) January-June 2014 pp 37-48.
- [21] D. N. Panigrahi, "Life Expectancy in India: Contributing Factors", International Journal of Innovative Research and Development", November, 2014 (Special Issue)Vol 3 Issue 12.
- [22] J.G. Sreekanthachari et al, "An overview of rural education in India", Advance Research Journal of

Social Science, Volume 4, Issue 1, June, 2013, 115-119.

- [24] Dr. Shridhar Kadam et al, “Assessment of Factors Contributing and Affecting availability and Retention of Health Workforce in Rural and remote areas of Odisha”, Indian Institute of Public Health (IIPH), Bhubaneshwar and Delhi, Public Health Foundation of India.
- [25] Prakash Kadave et al “Planning and Design of Green Village”, Special Issue of International Journal of electronics, Communication & Soft Computing Science & Engineering, Mar-2012.
- [26] Kim Tae-hwa et al “Construction of the Rural Development Index:The Case of Vietnam”, Journal of Rural Development 39(Special Issue):113-142.