Levels of Agricultural Development and Environmental Issues in India: A Geographical Perspective

Dr. Mohammad Taufique
Assistant Professor, Department of Geography, Aligarh Muslim University, Aligarh, Uttar Pradesh, INDIA

Received: March 01, 2020 Accepted: April 06, 2020

ABSTRACT: *Agriculture has been the primeval as well as the leading profession of peoples to earn the livelihood in the world as well as India. It is the prime source of food and also the sources of raw materials for various agro-based industries. Agriculture is the backbone of Indian economy, where almost 60 per cent of Indian peoples engage directly or indirectly. The agriculture and allied sectors contribute nearly 17.4 per cent of* ***Gross Domestic Product (GDP****) of India (Economic Survey, 2015-16). Agricultural development plays a marked role in the socio-economic development of the country. Economist, Sociologist, Planners, Researchers, Entrepreneurs, Academicians, Policy makers and Administrator hold the view that the arena of socio-economic development programmes depends ultimately on the levels of agricultural development. The use of modern scientific tools and technological innovations (like tractors, harvesters, chaff-cutters, threshers, levelers, mulching machine, trimmer, loader, sprayers, sprinklers system etc.) in agriculture sectors caused bumper production of food grains and non-food grains crops which ultimately boomed up this sector. The present study is an attempt to examine the agricultural scenario of pre and post independence of India, to analyse the spatio-temporal production of crops, bottlenecks grass-root problems of Indian agriculture and finally highlight the environmental issued caused by agricultural activities. The study is based on secondary sources of data. The result of the study shows that Green Revolution has changed agriculture sketchy of India by ample production of food grains and non-food grains crops with the application of heavy doses of chemical fertilizers like Nitrogen, Phosphorous, Potassium (NPK), Pesticides and Insecticides and so many others components. The study also reveals that the emergence of many environmental and ecological issues has turned up due modern agricultural practices such as salinisation, water-logging, soil erosion, changing of soil chemistry and depletion of micro-organism, dwindling of underground water table, noise pollution. The researchers suggest that there should be promotion of organic-farming on large scale, extension facilities, launching of various programme to train the illiterate farmers which may combinedly promote the sustainable agriculture in India.*

Key Words: *Agricultural Development, Sustainable Agriculture, Modern Agricultural Tools, Environmental Pollution, Green Revolution, Organic Farming*

Introduction:

"Agriculture is the most healthful, most useful and most noble employment of man"- George Washington. Agriculture is one the prime and widely distributed economic activity on the earth surface and still predominates in almost half of the world as the main economy. After shelter and cloth food is one of the most fundamental needs of human beings. No nation can hope to flourish in the environment of political, economic or social stability without securing ample and nutrisous food for its population either through domestic production or imports. Agriculture is the most important source of food and also the sources of raw materials for various agro-based industries. Due to rapid increase of population of India (121.01 crore, 2011 Census) there is abundant need of food grain to full fill the basic need of man.

Agriculture is the backbone of the Indian economy and main source of livelihood in rural people of India. Agriculture is the backbone of Indian economy and almost 60 per cent of Indian peoples are directly or indirectly dependent on agriculture. Agriculture and allied sectors contribute nearly 17.4 percent of **Gross Domestic Product (GDP**) of India (Economic Survey, 2015-16). Generally speaking, the word agriculture has been derived from a Latin term **'Agriculture'** in which **'Ager'** meaning **' field'** and **'Culture'** meaning **'to cultivate'**. The domestication of plants and animals has been started during Neolithic period (around 8000 B.C). The Longman modern English Dictionary defines the word Agriculture as "the science or the art or the practice of large scale soil cultivation in order to produce crops". Broadly speaking, Agriculture includes both raising the crops and rearing the animals.

In the process of agricultural development technology (modern inputs) plays a major role. The agricultural development programs based on modern technology are related to conservation of soil resources, expansion of all farm facilities, intensive farming through the application of modern techniques, manures, fertilizers and High Yielding Variety of seeds. The application of modern technology aims to

increase the efficiency of agricultural production. At the same time the productivity of the farm land has continuously changed under constant use of technology in agriculture. The adoption of new farming techniques developed through research and education have brought out diversification and which increase yield per hectare. The speedy and extensive development of agriculture is more or less depends on technological change and the spatial diffusion of agricultural innovations. Increase in the cultivated and double cropped area is often due to technological improvements (**Mohammad Noor, 1981**).There are different variable which determine the development of agriculture of any region. The new agricultural strategy relies on High Yielding Verities of crops, multiple cropping, the package approach, modern farm practices and spread of irrigation facilities. The biggest achievement of this strategy has been attainment of self-sufficiency in food grains (**Rao, 1996**). The development of agriculture sector can serve up as a catalyst for rapid growth of whole economy (**Maity and Chatterjee, 2006**).

It is one of the greatest challenges of the 21st century that, to feed the large number of increasing population, whereas the natural resources are (fixed) limited, thus we need with environmental sustainability. The farmers due to dogged work and low profit shifted from the traditional agriculture towards the modern one. Modern agriculture, however, enhanced the food productivity but with the acceleration of several environmental problems such as, climate change, unseasonal rainfall, biodiversity loss, soil degradation and environmental pollution (**Zhang et al, 2017**).Modern agriculture is a major drive for the loss of crop genetic resources in the third world due to the adoption of HYVs and planting the most fields with genetically uniform cultivators (**Attieri and Merrick, 1987**). In the contexts of sustainable food production with changing climate, the smart traditional practice is an urgent need. It is the right time to rediscover and reimplement the traditional practices to improve the socio-ecological integrity with the organic farming.

The Green revolution (1967-68) has changing the Indian agriculture with the production of ample cereals crops, but at the contemporary, green revolution has also adversely effected on the soil fertility, nitrate toxication, alkaline soil, saline soil, water pollution and noise pollution etc. In the states of Punjab, Haryana, Western Uttar Pradesh, Gujarat, Andhra Pradesh etc. the ground water table has been dwindling year by year.

Objectives of the Study:

Keeping in the view of aspects of current scenario of agricultural sector in India the following objectives have been taken into consideration.

1. To analysis the current levels of agricultural development in India.
2. To highlighted the major problems of Indian agriculture.
3. To know the environmental problems caused by the agricultural sector.

Database and Research Methodology:

The entire study is based on secondary sources of data. The data has been obtained from Agricultural Statistics 2018, Ministry of Agriculture and farmer welfare, Land-use Statistics 2015-16, Directorate of Economics and Statistics, Department of Fertilizers and Department of Agriculture, Cooperation and Farmers Welfare Reports, 2018, Census of India, 2011.

Results and Discussion:

Out of total population of 121.01 crores (Census 2011), 68.06 per cent people still live in rural area where agriculture is the main stay of the economy. The increasing population depending on land resources for their livelihoods is convincing to use of modern technology for obtaining higher returns from their limited land holdings. The moderns inputs such as tractor, harvester, thresher, chaff cutter, tillers, levelers, sprayer, tube well, pump set (diesel and electric), chemical fertilizer, pesticides, insecticides are responsible for increasing the land productivity and levels of agricultural development in the country.

Table 1 : Year-wise changing of Major crops Area in India from 1950-51 to 2018-19

Crops	Area (in Million Hectares)								
	1950-51	1970-71	1980-91	1990-91	2001-02	2005-06	2010-11	2015-16	2018-19
Rice	30.81	37.59	40.15	42.69	44.79	41.13	42.86	43.50	45.09
Wheat	9.75	18.24	22.28	24.17	25.73	27.14	29.07	30.42	32.16
Maize	2.48	11.32	17.41	20.94	22.57	24.12	26.36	27.21	29.34

Pulses	19.09	22.54	22.46	24.66	20.35	22.17	26.40	24.91	20.18
Oilseeds	10.73	16.64	17.60	24.15	22.77	24.55	27.22	26.09	29.44
Sugar cane	1.71	2.62	2.67	3.69	4.32	4.88	4.93	5.26	6.15
Cotton	5.88	7.61	7.82	7.44	8.53	9.61	11.24	12.29	15.46

Source: Agricultural Statistics 2018, Ministry of Agriculture and Farmers Welfare

Table 1 shows during the decades of 1950-51 the area of food grain crops like Rice 30.81 million hectares, wheat 9.75 million hectares, Maize 2.48, Pulses 19.09 and non-food grains oilseeds 10.73, sugarcane 1.71, cotton 5.88 million hectares, but with the development of agricultural inputs the area of major crops both food-grains and non-food grains has substantially increased.

Table 2: Production of Major-Crops in India from 1950-51 to 2018-19

Crops	**Production (in Metric Tonnes)**								
	1950-51	**1970-71**	**1980-91**	**1990-91**	**2001-02**	**2005-06**	**2010-11**	**2015-16**	**2018-19**
Rice	20.48	42.22	53.63	74.29	84.98	91.23	95.98	104.41	116.71
Wheat	6.46	23.83	36.31	55.14	69.68	74.81	86.87	92.29	103.34
Maize	1.73	7.49	6.96	8.96	12.04	17.12	21.73	22.57	25.04
Pulses	8.41	11.82	10.63	14.26	11.08	14.56	18.24	16.32	28.43
Oilseeds	5.16	9.63	9.37	18.61	18.44	26.14	32.48	25.25	34.52
Sugar cane	57.05	126.37	154.25	241.05	295.96	311.41	342.38	348.45	382.91
Cotton	3.04	4.76	7.01	9.84	9.52	16.41	33.00	30.01	35.16

Source: Agricultural Statistics 2018, Ministry of Agriculture and Farmers Welfare

Table 2 depicts that the production of major crops both food grains and non-food grains, during the year 1950-51 the production of rice showing 20.48 metric tonnes, wheat 6.46 metric tonnes, maize 1.73, pulses 8.41, oilseeds 5.16, sugarcane 57.05, cotton 3.04 metric tonnes. But during the year 2018-19 the production has increased leaps and bounds due to advancement of modern agricultural advancements and also due globalization era.

Table 3: Total Agricultural Workers to the Total Workers in India from 1950-51 to 2011-12

Year	**Total Population (in Millions)**	**Average Annual Exponential Growth Rate (%)**	**Rural Population (in Millions)**	**Total Workers (in Millions)**	**Agricultural Workers (in Million)**		
					Cultivators	**Agricultural Labourers**	**Total**
1950-51	361.1	1.25	298.06 (82.7)	139.5	69.9 (71.9)	27.3 (28.1)	**97.2 (69.7)**
1960-61	439.2	1.96	360.3 (82.0)	188.7	99.6 (76.0)	31.5 (24.0)	**131.1 (69.5)**
1970-71	548.2	2.20	439.0 (80.01)	180.4	78.2 (62.2)	47.5 (37.8)	**125.7 (69.7)**
1980-81	683.3	2.22	525.6 (76.09)	244.6	92.5 (62.5)	55.5 (37.5)	**148.0 (60.5)**
1990-91	846.4	2.16	630.06 (74.05)	314.1	110.7 (59.7)	74.6 (40.3)	**185.3 (59.0)**
2000-01	1028.7	1.97	742.06 (72.02)	402.2	127.3 (54.4)	106.8 (45.6)	**234.1 (58.2)**
2011-12	1210.9	1.50	833.7 (68.09)	481.9	118.8 (45.1)	144.3 (54.9)	**263.1 (54.6)**

Source: Agricultural Statistics 2018, Ministry of Agriculture and Farmers Welfare

Table 3 shows that during the year 1950-51 the total workers of India numbered to 139.5 million and total agricultural workers contributing 97.2 millions. In 1980-81 the total worker of India has 244.6 million and total agricultural worker has 148 millions and during the year 2011-12 the total workers of India has 481.9 million and total agricultural workers has 263.1 million due to huge demand of food grains to feed the large scale population, expansion of small land holding farmers for the production of major crops.

Table 4: Distribution of Gross Cropped Area in India from 1950-51 to 2018-19

Crops	Distribution of Gross Cropped Area (in percentage)								
	1950-51	1970-71	1980-91	1990-91	2001-02	2005-06	2010-11	2015-16	2018-19
Rice	23.5	42.22	53.63	74.29	84.98	91.23	95.98	104.41	116.71
Wheat	6.46	23.83	36.31	55.14	69.68	74.81	86.87	92.29	103.34
Maize	1.73	7.49	6.96	8.96	12.04	17.12	21.73	22.57	25.04
Pulses	8.41	11.82	10.63	14.26	11.08	14.56	18.24	16.32	28.43
Oilseeds	5.16	9.63	9.37	18.61	18.44	26.14	32.48	25.25	34.52
Sugar cane	57.05	126.37	154.25	241.05	295.96	311.41	342.38	348.45	382.91
Cotton	3.04	4.76	7.01	9.84	9.52	16.41	33.00	30.01	35.16

Source: Agricultural Statistics 2018, Ministry of Agriculture and Farmers Welfare

Table 4 depicts that during the year 1950-51 the distribution of gross-cropped area of rice has a share of 23.5 per cent, wheat 6.46 per cent, Maize 1.73 per cent, pulses 8.41 per cent, oilseeds 5.16, sugarcane 57.05 per cent, cotton 3.04 per cent, but in the year 2018-19 the distribution of gross cropped area has increased due large demand of food grains, advancements of modern agricultural inputs, availability of extension facility at the rural areas, government loans to the farmers, etc.

Table 5: Consumption and Production of Fertilizers in India 1981-82 to 2017-18

Year	Consumption (in Lakh Tones)				Production (in Lakh Tones)			
	Nitrogen (N)	Phosphorous (P)	Potassium (K)	Total	Nitrogen (N)	Phosphorous (P)	Potassium (K)	Total
1981-82	40.69	13.22	6.73	**60.64**	31.44	9.49	8.34	**40.93**
1990-91	79.97	32.21	13.28	**125.46**	69.93	20.52	15.51	**90.45**
2000-01	109.20	42.15	15.67	**167.02**	109.61	37.43	19.73	**147.04**
2010-11	165.58	80.50	35.14	**281.22**	121.57	42.23	25.87	**163.80**
2015-16	173.72	69.79	24.02	**267.53**	134.16	43.94	39.34	**178.10**
2017-18	169.58	68.54	27.79	**265.91**	133.86	47.23	43.15	**181.09**

Source: Agricultural Statistics 2018, Ministry of Agriculture and Farmers Welfare

Table 5 shows that during the year 1981-82 the total consumption of fertilizers (NPK) has 60.64 Lakh tonnes and the production was 40.93 Lakh tonnes, but in the year 2017-18 the total consumption of fertilizers (NPK) has 265.91 Lakh tonnes and production of fertilizers (NPK) has 181.09 Lakh tonnes due expansion of agricultural land, large scale of intensive cultivation, huge demand of food grains etc.

Table 6: State-wise Consumption of Fertilizers (NPK) in India (1990-91 to 2016-17)

Name of State	Consumption of NPK (In Thousand Metric Tonnes)						
	1990-91	2000-01	2005-06	2010-11	2014-15	2015-16	2016-17
Punjab	830.54	1256.16	1531.09	1972.24	1717.75	1860.45	1933.72
Haryana	616.15	701.34	1143.22	1350.20	1303.15	1414.04	1556.08
Andhra Pradesh	780.23	1348.31	1632.16	2747.10	1738.83	1922.32	2188.36
Uttar Pradesh	1342.43	1983.05	2853.66	4650.98	4271.64	4342.66	4511.19
Bihar	378.90	556.21	771.29	1526.79	1346.19	1487.58	1626.11
Gujarat	318.39	494.59	881.65	1341.97	1684.00	1715.29	1842.91
Karnataka	523.43	728.87	1217.05	1531.20	1837.90	1922.02	2177.52
Madhya Pradesh	216.76	587.32	932.51	1869.30	1796.94	1819.27	2012.33

Maharashtra	541.71	816.23	1541.05	2472.62	2814.66	2911.44	3144.72
West Bengal	445.90	778.45	1291.21	1560.01	1466.41	1521.77	1683.23

Source: Agricultural Statistics 2018, Ministry of Agriculture and Farmers Welfare

Table 6 depicts the state-wise consumption of fertilizers in India for the year 2016-17. Uttar Pradesh ranked the highest consumption of fertilizers 4511.19 (Thousand Metric tonnes), followed by Maharashtra (3144.72), Andhra Pradesh (2188.36), Madhya Pradesh (2012.33), Karnataka (2177.52), Punjab (1933.72), West Bengal (1683.23), Bihar (1626.11) Haryana (1556.08). The Agricultural scientist has predication that due to heavy doses use of fertilizers NPK, the land of Punjab, Haryana, Andhra Pradesh, Uttar Pradesh will become saline and alkaline after 50 years.

Renaissance of Agriculture Sector:

With the development of agriculture and its allied sectors the following revolution has emerged for better employment and supplementary remunerative income to the farmers from the field. These may be read as:

Table 7: Major Agricultural Revolutions in India

Major Revolution In India	
Name of Revolution	**Associated Sector**
Green Revolution	Agricultural Production
Blue Revolution	Fish Production
Brown Revolution	Cocoa/Leather Production
Golden Fibre Revolution	Jute Production
Golden Revolution	Horticulture
Grey Revolution	Fertilizers Production
Pink Revolution	Onions/Prawn Production
Red Revolution	Tomato/ Meat Production
Silver Revolution	Egg Production
Silver Fibre Revolution	Cotton Production
Round Revolution	Potato Production
Yellow Revolution	Oil Seed Production
White Revolution	Milk / Dairy Production

Environmental and Ecological Problems associated with Agriculture:

India emerged a leading nation in terms of agricultural production as well as agricultural productivity due to adoption and innovation of agricultural technology, modern inputs, High Yielding Variety of seeds and others. But at the same time it has created a lot of environmental and ecological problems that emerged out of the cultivation of High Yielding Varieties of Seeds. These may be discussed in the following manner:

1. **Salinisation:** The High Yielding Varieties of Rice and Wheat requires abundant water supply. This continuous supply of water through the irrigation during the summer and winter season have changed the soil chemistry. In the arid and semi-arid areas, owing to capillary action the soils become either acidic or alkaline types. High and repeated irrigation leads to deposition of salt content into the soil.
2. **Water logging:** Water logging is the other major problem associated with over-irrigation. The repeated irrigation for the cultivation of Rabi and Kharif crops in the winter and summer season have resulted into water-logged condition, especially along the canals. Vast area of the country has the problem of water logging in one way or other.
3. **Soil Erosion:** The soil erosion problem is a worldwide phenomenon. The presence of forest has reduced the danger of soil erosion significantly. In the era of 20th century due to population explosion, the agricultural land has been expanded by clearing and cutting of trees and forest. As a results of deforestation affecting the environment and ecology diversity adversely. The rate of soil erosion has tremendous increased since our independence caused by various physical, biological and of course anthropogenic factors.
4. **Changing of soil Chemistry and depletion of micro-organism:** The High Yielding Varieties of seeds perform better if heavy doses of chemical fertilizers, insecticides and pesticides are applied for the cultivation cereals and non-cereals crops. These chemical elements destroy the micro-organism which is necessary to maintain the fertility of soil.

5. **Depletion of Underground Water-table:** These High Yielding Varieties of Seeds requires abundant supply of water. Underground water is meant for drinking purposes but the continuous lifting of water through water tube-wells and pump sets has lowering the water table.
6. **Noise Pollution:** In cultivation of High Yielding Varieties of Crops the use of tractors, harvesters, threshers, chaff-cutters, crushers have increased the noise pollution which have disturbed the peace and tranquillity in rural area of India.

Other Major Problems of Indian Agriculture:

Although India has achieved a lot in agriculture sector, since its independence where it has become self reliant in food production but this sector still facing a large numbers of problems. They may be noted as

I. Fragmentation of landholding
II. Low productivity
III. Use of primitive technology
IV. Indian agriculture is labour intensive
V. Rain-fed agriculture
VI. Heavy pressure on Man-land ratio
VII. Subsistence farming
VIII. Mixed farming
IX. Limited Intensive Agriculture
X. Traditional bond agriculture
XI. Lack of marketing and cold storage facilities
XII. Poverty and Indebtness of the farmers
XIII. Inadequacy of extension service
XIV. Soil alkaline and saline
XV. Soil erosion and Soil degradation
XVI. Inadequate irrigation facilities
XVII. Lack of infrastructural facilities
XVIII. Lower status of agricultural practices in the Society
XIX. Inadequate agricultural research and education
XX. Lack of credit and banking facilities in rural areas

Conclusion and Suggestions:

The country needs a new vision for Indian agricultural system for spreading of happiness among the farmers and rural families. Bio-happiness through the conversion of our bio-resources into wealth meaningful to our rural families should be the goal of our national policy for our poor famers. We should always remember the following quotes- **"In winter cold or summer intensive heat, farmers and ranchers works hard in the open field, so the world can eat".** Indian agriculture is referred a gamble on monsoon, as the year in which monsoon came timely there is bumper production in food grains and non food grains crops, whereas in case of low monsoon, there is low production resulted crop failure and famine. This leads to jump of price rise of different crops and vegetables. It is suggested that in high level of agriculture development pockets of India should be balanced with application of chemical fertilizers use, use of NPK in required proportion, to provide water and fertilizers according to the nature of soil and nature of crops, use of modern techniques of irrigation (sprinkler, drip and trickle system), use of green manures, and cow dong in the soil. All these factors promote sustainable development (eco-friendly) in agriculture for maintaining crop yield and crop production. The low level of agricultural development pockets of India should require proper irrigation facilities, cultivate the crops according to nature of the soil and nature of crops, promote crop diversification in the field, to encourage the farmers for balanced use of NPK, pesticides, insecticides through extension services in rural areas etc. We should look upon agriculture not just as a food-producing machine for the urban population, but as the major source of skilled and remunerative employment and hub for global outsourcing **(M.S. Swaminathan).** The farmers are the only man in our economy who buys everything at retail price, sells everything at wholesale, and pays the freight in both ways. The farmers are the real magician who produces money from the mud.

India is a developing country in the world where there is tremendous scope for development in agricultural sector. The Ministry of Agriculture, Government of India should implement the agricultural subsidies, crop insurance facility (due to unseasonal rainfall, prevalence of drought and flood), crop failure subsidies, agricultural loan by NABARD and various cooperative sectors in simple and honest manner. If

the proper infrastructural and technological facilities are provided to the farmers, there is no doubt the country will achieve better agricultural development in future. We should remember the famous quotes of Thomas Jefferson, **"Agriculture is our wisest pursuit, because it will in the end contribute most to real wealth, good morals and happiness"**.

Reference:

1. Ashraf, S.W.A and Singh, G. (2012), spatial variation in agricultural development in Bulandsahar district of Western Uttar Pradesh (India), International Journal of development and Sustainability, Vol. 1, No. 1, pp. 47-56.
2. Commen ,M.A (1996), Technological change and its diffusion in agriculture, Agricultural situation in India, Vol. 21, Nos. 7-12, pp 523-24.
3. Choudhry, A.K and A.S Serohi (1974), Delocation of fertilizers among crops and region in U.P , Indian Journal of agricultural Economic, vol. 27, No. 3, p. 27.
4. Mahadevan, R. (2003), Productivity Growth in Indian agriculture: the role of globalization and economic reform, Asia-Pacific Development Journal, Vol.10, No. 2, pp. 57-72.
5. Maity,B, Chaterjee, B. (2006) Impact of modern technology on food grain production in West Bengal: A Economic analysis, Indian Journal of Regional Science, vol. 38, No. 2, pp. 96-14.
6. Mohammad, Noor (1981), Technological change and its diffusion in agricultural Geography, New Delhi, vol. 4, pp.207-21 and 267.
7. Raman, R. and Kumari, R. (2012), Regional disparity in agricultural development: A district level analysis of Uttar Pradesh, Journal of Regional Development and Planning, Vol. 1, No. 2, pp.71-90.
8. Rao, V.M. (1996), Agricultural Development with a human face, Economic and Political Weekly, 31 (26), pp. A 52- A-62.
9. Siddiqui, S.H. (1990), Trends of Agricultural Development in the Northern Bihar Plains, The Geographer, Aligarh, vol. 37, No. 2 pp.63-69.
10. Siddiqui, S.H and Ahmad, M.(2004), Levels of Agricultural Development in Uttaranchal, Indian Journal of Regional Science, Kolkata, vol. 36, No. 2 pp. 25-29 .
11. Siddiqui, S.H., Afzal, F., and Hoque, A. (2017), Assessment of irrigation extension and development in Uttar Dinajpur: A Block level Analysis, Asian Profile International Journal, Canada, Vol. 45, No 5, pp. 421-435.
12. Siddiqui, S.H.,and et. al (2015), Impacts of Social disparities on agricultural development in West Bengal, The Geographer Journal, A.M.U., Aligarh, Vol. 62, No. 1, pp. 23-33.
13. Taufique, M., Hoque, A. (2017), "Role of Technology on the development of agriculture in Malda district of West Bengal (India): A Geographical Analysis", International Journal of Scientific Research and Development (IJSRD), Vol.5 Issue 03, pp. 413-416.