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Original Article

Agricultural Transformation and Rural Development: A Geographical Analysis

Dr. Sambhaji D. Shinde
Professor, Department of Geography, Shivaji University, Kolhapur Maharashtra, India

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Abstract

This study explores the multifaceted relationship between agricultural transformation and rural development from a geographical perspective. It underscores agriculture's central role in rural economies, particularly in developing countries like India, where rural development has often lagged despite significant policy focus on agricultural advancement. The research develops a comprehensive theoretical framework that categorizes agricultural transformation into typologies reflecting changes in resources, geopolitical settings, and farming methods. Case studies from China, Romania, and South Africa illustrate the diversity of agricultural transitions influenced by local contexts. The paper further examines the roles of technology, socio-economic factors, environmental challenges, policy frameworks, and institutional dynamics in shaping rural development outcomes. Special attention is given to the impacts of globalization, climate change, gender dynamics, and education on agricultural systems. Using a mixed-methods approach, including qualitative field studies and secondary data analysis, the research concludes that effective agricultural transformation demands integrated policy support, geographical sensitivity, and sustainable practices to promote equitable and long-lasting rural development.

Keywords: *Rural Development, Geographical Analysis, Sustainable Agriculture, Rural Livelihoods, Technological Innovation, Socioeconomic Factors, Institutional Frameworks, Globalization, Food Security*

Introduction

As is now widely recognized, an "Agricultural Transformation" is a necessary condition for rural development, and it is widely believed that policies for agricultural transformation should be of high priority in any country pursuing rural development (Da Silva Machado, 2017). Furthermore, so the statement goes, "if necessary, measures are taken," the experience of the "first world" countries—like access to state-of-the-art technology, cheap credit, capital, land, infrastructural facilities, irrigation, and agricultural extension service, and the methods of cultivation used there—will successfully bring about agricultural transformation in a country. It goes on to say that agricultural transformation will, in turn, lead to enhancements in rural power and other characteristics of rural life. Such expectations for agricultural transformation have, however, resulted in disappointing performance in many developing countries.

India is no exception, where expectations for agricultural transformation have remained largely unfulfilled. It is largely accepted that agriculture is a socially, politically, and economically crucial sector in India. Despite recent phenomenal growth in manufacturing and services, agriculture is still contributing a significant urban-rural disparity in per capita income.

Address for correspondence:
Dr. Sambhaji D. Shinde
Professor, Department of Geography, Shivaji University, Kolhapur Maharashtra, India
Email: *sambhajishinde3@gmail.com*

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In fact, contrary to expectations, particularly since the early 1990s, economies across the world have been undergoing a second phase of an economic transformation, causing sharp urban-rural disparity in per capita income and even exacerbating poverty in the countryside in many economies and countries. Such developments in rural India have recently raised a valid question in social science: why rural development in India has remained elusive despite much emphasis on agricultural transformation as a precondition for rural development. Unmasking the unfulfilled expectations of agricultural transformation is complicated because policy measures exclusively directed towards the agricultural sector might have been insufficient to bring about agricultural transformation in a developing country like India. On the contrary, it might have been necessary to create a congenial environment for the agricultural sector through its broader economy, over and above the policy measures directed towards the agricultural sector.

Theoretical Framework

Agricultural transformation is a significant process affecting rural areas in the developing world and is often seen as a means for rural development. While rural development has been defined along several asset-based dimensions and widely discussed with regard to its measurement, poverty reduction, agricultural intensification, and agribusiness development, agricultural transformation has received comparatively less scholarly attention. Therefore, the notion of agricultural transformation is elucidated by typologies, that is, heuristic frameworks called geographical maps to reflect simple yet informative classifications of the complexity in the real world. A geographical classification of agricultural transformation processes indicates a set of dichotomous variables describing significant changes in (1) the resource pool and agricultural livelihoods, (2) the geopolitical environment, and (3) farming methods; it partitions agricultural transformation into six types, that is, agriculture from depletion to development, agriculture from less to more scale-intensive, agriculture from conventional to conservative, agriculture from subsistence to market-oriented, agriculture from localised to commodity chain embedded, and agriculture from diverse to specialised in the resource-sensing environment. It is argued that agricultural transformation-associated rural changes are location-specific and exemplified by three contrasting types in China: the agricultural transformation from depletion to development of the Loess Plateau, the agricultural transformation from less to more scale-intensive in Hebei's Chengde, and the agricultural transformation from subsistence to market-oriented in the eastern coastal areas. With these types, the geographical classification of agricultural transformation processes is maintained.

The contribution of policies and external influences are considered where appropriate. Taking the ongoing rural changes across the developing world as a starting point, the wide impacts of agricultural transformation on rural development are elucidated on a process basis. The definition and dimensions of agricultural transformation are explicated, mainly by revisiting its historical evolution in the context of rural changes, typifying processes, mechanisms, and implications, and wrapping interconnections between agricultural transformation and agricultural policy. Not only the framework, but also some geographical maps are built for the first time to organize relevant knowledge about agricultural transformation.

Historical Context of Agricultural Transformation

The economic and social development of countries is closely related to the evolution of agricultural production systems and rural policies principally concerned with food production and food security. Three important characteristics must be taken into account: (i) the differences between societies and territories in historical development and the evolution of endogenous determinants of agricultural transformations; (ii) the structural evolution of production systems in the context of globalization, and (iii) the systemic relationship between urban – rural areas and their contribution to sustainability (Da Silva Machado, 2017).

In early modern Europe, Merchant capitalism accepted agrarian capitalism and the productivity growth of agriculture. This is the context of the agriculture-industrialization dualism. In developing countries, agrarian capitalism in "dual" agriculture systems with a small number of

commercial farms with an intensive production system, high productivity, and a large number of smallholders with a subsistence farming system and very low productivity, tended to diversify and oligopolize, contributing to an accelerated process of structural transformation. Simulation exercises with development policies tend to overestimate the role of horticultural exports because, in fact, agriculture still concentrates on traditional commodities.

This has important implications for the understanding of agricultural transformation as a complex process. In the short run, there is a trade-off between productivity growth, rural development/diversification, income inequality, and farmer welfare. In the long run, agricultural transformation compatible with rural development/diversification and equity in the distribution of wealth, income, and productive resources requires good policies to capitalize on market access, education, and investment in indigenous science and technology.

Geographical Perspectives on Rural Development

Geographical perspectives have been applied to rural development to widen its interpretation, explore its apparently paradoxical processes, offer reflections on the contemporary rural world, and suggest paths for future inquiries and analyses. The last three issues focus on the apparent paradoxes of rural development. As rural change is often perceived as destructive, the rural implications of current processes are considered as well, particularly as they affect the identities and livelihoods of some of the world's most disadvantaged population segments: the rural poor, the landless, peasants, and other small-scale producers. These trends have been linked to globalization processes. The future of rural areas and their populations as well as the ongoing debates and scholarly contestations associated with different interpretations of rural change are also reviewed.

However, geography itself has been subjected to negative perceptions of rural development. The geographical community has not adequately engaged with rural development issues in the academic arena despite geography's traditionally extensive involvement with rural issues. The critical perspective on rural development espoused would remain partly unfulfilled unless geographers became active participants in the debates and discourses on rural development at the same level as rural sociologists or economists are. A challenge facing rural geographers is to advocate a geographical perspective on rural development. To do so, geography's rich history of rural development studies is presented, in which both normative and analytical concerns have been given ample attention. This historical overview indicates the breadth and depth of geographical engagement with rural development issues, though it has not systematically focused on a socio-spatial conception of development in the manner as envisioned.

Rural development has recently reappeared on the global agenda. Much attention has again been directed at enhancing the quality of life and improving livelihoods in rural areas. Action plans and policy instruments have been adopted by many governments and organizations. Such a revival in interest reflects an apparent economic, social, and political recalibration of the rural development agenda consequent upon globalization processes, restructured geographical scales of production and consumption, altered socio-spatial divisions of labor, and renewed integration of the rural and urban. It is argued that these processes are reshaping ruralities globally, but in diverse and geographically uneven ways. The opportunity structures newly emerging spaces and sites in rural areas and rural development policy responses consequently adopted by political agencies across scales are outlined and discussed.

Methodological Approaches

This section outlines the methodological approaches employed in the research process through which the objectives of the study were achieved. The methodological approach depends on the nature of the problem being investigated and the questions that require answering. Although this could be quantitatively and qualitatively determined, a mixed method was adopted with an emphasis on qualitative method. Available secondary data was complementarily employed in the primary datum collection relying on content analysis. Cognizant with the specific objectives of the study, four major methodological approaches were specified. They include sampling and sample

size determination, data source and data collection techniques, data analysis and interpretation, and ethical consideration.

Drawing a rural settlement plus a semi-urban background and town with good connectivity was seen as important for data generation through using methods such as focus group discussion. Thus, Awassa Town and surrounding rural Kebeles were considered as a population of the study. For this purpose, based on the number of representatives representing the kebeles of the target town and lay communities, study kebeles were purposely selected. Thus, two kebeles were selected from Sadicha and the rest used stratified random sampling. No town kebeles were selected since they were not seen eligible to answer questions about household agricultural transformation. Sample Kebeles identified were Sadicha, Ali Suma, Gebeya Bolo, and Makana Amba. To generate data from actors engaged in agricultural activities within selected kebeles, household heads were taken as a sample of the study. A total of 14 representatives of people per Kebele were taken as a sample of the study through purposive sampling.

Data from primary sources was gathered using semi-structured interview, focus group discussion, and key informant interview methods. The interview guide for household head in semi-structured (both open and close-ended types) was prepared for information gathering based on the specific objectives of the study. Using language, importance and the objectives of the study were explained well to make them comfortable and provide appropriate data. Focus group discussion with representatives of Kebeles was employed to get a better understanding of the issue to corroborate data gathered through individual interview with others.

Case Studies of Agricultural Transformation

Although the agricultural transformation is analyzed in a broader context in this book, it is still essential to use rich local materials to illuminate the cosmopolitan issues. Beijing for its special location and Shanghai for its enormous social and economic products are selected as case study areas. While Beijing represents a newly emerging mega-city, which has both urban and rural components, Shanghai represents a traditional big city focusing on urban development but with an increasing concern regarding its urban and rural fringe management. The rural areas of Beijing and Shanghai are, respectively, used for socio-spatial evolution and the conflict of agricultural modernization between representative agricultural modernization and self-sufficiency-based modernization, which reflect some of the most salient characteristics of ongoing agricultural transformation and rural development in Chinese mega-cities.

With the increasing development pressure since the reforms, the capital city of China–Beijing–pursues an expansion through a more radical ex-urban land management. “Illegal land use” and “urban sprawl” in pursuit of illegal profit have been buzzwords, which highlight the conflict between the local state and market families. This abuse of rights not only has inflicted direct losses to the exurban farmlands and farmers but also leads to consequent social instability. Saving the countryside and detached homes became popular issues in state policies, social practices, and public discussions.

A comprehensive taxonomy of Beijing’s socio-spatial evolution is proposed by understanding the interplay between different types of individuals and the behavior of the political game. Core land use planning taken in July 2004, a transitional state to Beijing’s spatial enhancement, which imposes restrictions on the agricultural land was interpreted; and persistence home and immediate unsatisfaction motivations were endowed to various types of market families, which directly inflected on the transformation of the rural land use.

Case Study 1: Region A

A frame was delineated within the time horizon of 2080 in order to identify a limited number of alternative development alternatives of use and economic efficiency for South-Muntenia region. Fnc. Murgoci will be analyzed, correlated with one or more preset objectives of alternative production intensification. Thus, based exclusively on agricultural production and without the involvement of inputs other than physical ones, productivity will increase significantly by a systematic improvement of the agricultural technology. The use of inputs such as chemical

fertilizers, pesticides and treatment for the vine or fruit trees and mechanization will lead to significant amounts of fertilizer and pesticide in water, air and soil as early as 2015. At the same time, soil restoration and halt of salinization measures should not be neglected. With the exception of the occurrence of unusual climatological or phytopathogenic phenomena, the conclusion is that the two adverse processes will intensify with the resoluteness of nothing advanced agricultural technics area.

The economic evaluations made from the perspective of the three distinctive groups of crops and animal husbandries draw forth regional economic competitiveness. Specifically, with reference to vine and fructiculture, it can be noticed that, provided that the stand mean age is below 18 years, on a medium return of 10055030 kg worth 30 euro/ton, an income of approximately 9.03 million euros would be obtained. Alternatively, on notionally increasing production can be envisaged by implementing in a progressive manner a watering system, while adopting a sub-level depth separator enabling the plantation to overcome draught periods, respectively, on the estimation that the stand mean age is 0810 years and, in the same production conditions, the gross income would grossly reach 8.17 million euros (more or less). In all analytical instances, gross revenues would reach or group near 9 million euros and apparently substantial economic competitiveness would therein independently be obtained by monitoring annual co-efficiency of direct production costs that should correlate with production and therefore gross income, attained amounts so that operational profitability would be anywhere above 30%.

Case Study 2: Region B

The South-Muntenia development region is located in the southern part of Romania, encompassing a highly differentiated territory. As a transitional region, levels of both development and the development challenges are highly uneven, with more developed localities located near metropolitan centres and underprivileged ones on the periphery, such as the more distant rural communities. Based on the existing strategic and analytical documents, a few development priorities with a regional and local relevance for the agricultural sector were established and analysed. The region's terrain is predominantly hilly, with plains in its northern (Ciorani, Costeşti – 138 m) and south-eastern (Căscioarele – 23 m) parts, sloping down to -20 m, as well as the Danube Valley on its border with Bulgaria (Giurgiu County). The climate is temperate-continental, specific to the intra-continental plains of eastern Europe, with uncertainty in rainfall due to the quasi-periodical phenomena of drought, frost, torrential rains and hail – sometimes extremely damaging to agriculture. Agriculture represented a significant sector for the economy of this region, due to natural, historical and economic conditions. As of 2015, the total area capable of being cultivated in the area was of over 2,458,720 ha, of which 813,459 ha (about 30%), could be irrigated. In 2015, only 0.05% of the area equipped with irrigation systems was in use. The analysis also highlighted the existence of a production potential much greater than the level actually reached in terms of animal husbandry, cereals, vegetables and fruit. Thus, in relation to the 2015 production, a potential of about 1 million tons existed for animal husbandry, 172,000 tons for vegetables and over 3 million tons for cereals. In relation to existing potential by fruits and nut trees, it is found an almost insignificant utilization of only 1% by modern orchards. A degree of utilization of only 28% by the deer population was also recorded. Of the existing potential of about 470,000 sows, only 60,000 were registered. On the other product side, there are differences in level depending on the relative proximity/distance and communication facilities between the centre of consumption (Bucharest) and the processing units. An opportunity calculation can thus be made for implementing the restructured programs for each of the three selected products (Ionel Bucur, 2017).

Case Study 3: Region C

The interior of Region C is predominantly a plateau, which is locally called "the Highveld". The Highveld is exceptionally flat and is generally more than 1 500 m above sea level. The most important rivers are the Vaal River that drains into the Atlantic Ocean and the Limpopo River that drains into the Indian ocean. The potential agriculture of Region C depends mainly on the climate, which varies widely throughout the area.

The northern half of Region C is regarded as dryland and the southern half as a summer rainfall area. The essential feature of covered agriculture in Region C is the irrigation on crops, primarily citrus, lucerne and maize. The irrigation water comes from ground and surface water, the latter from the Vaal and Limpopo River systems. Climate and physical environment play important roles in the transformation of agriculture. In general, this region is well-endowed with climate and physical environment compared to the other case study areas (van Zyl et al., 1993). Even though the production potential is high, agriculture in Region C is at present not as well developed as in the other areas. About 47% of the total land area is used for agricultural purposes and this is lower than in Region E and D. About 64% of the agricultural land is suitable for cropping and irrigation. Although this percentage is higher than in Region E and D, the cropping sector is the smallest in terms of area and value of production. Production of crops is the most important part of agriculture in Region E and D, but it is the smallest sector in Region C. Pasture is the most important land use, but it is not well managed. Agriculture is dominated by extensive and non-commercial farming. Therefore, there is a need for agricultural development to change the prevailing conditions, to improve quality of life, to create jobs and to increase production. The agricultural sector of Region C can be analysed in terms of importance, potential, spatial distribution, structure and policy environment.

Impact of Technology on Agriculture

The technological capability of agriculture is directly related to employment per capita in other sectors of the economy. The employment creation impact of agriculture should also be seen in terms of the employment per capita generated in the entire economy. The agriculture sector can generate a higher employment per capita than any other sector of the economy at lower productivities (Bonger, 1970). Economic development and agricultural growth are to an extent function of the level of technology in agriculture. A low level of technological capability gives a substantial degree of self-regulatory nature of agricultural growth. The feedback mechanism against rural-urban migration prevails at low level of agricultural technology. Greater reliance on labour intensiveness of techniques devalues the significance of demand factor against rural-urban migration. The agricultural transformations in 1966-1980 were associated with considerable diffusion of the new agricultural inputs in this relatively less developed rural economy. A combination of technological inputs and favourable agrarian and macro-economic policy settings offers a good understanding of the breakthrough improvements in land productivity in agriculture and expansion of the area of cultivation. Technological improvements occurred along with farm size innovations and progressive agrarian reforms.

The new technology in agriculture comprised new improved relaxation fertilizer, improved seeds, herbicides, insecticides, deep ploughing by tractor, genuine fertilizer and improved institutional services. The precondition for the diffusion of the new agricultural inputs was the 1966 Egyptian agricultural stand. The analytical framework employed is a combination of exogenous productivity change models and dual modeling. The diffusion of the combined inputs and output estimates 245 nun, 17407 plots and 65563326 Qebeli per year respectively against the base period estimates, which gives an offer of 290 agricultural plots year per input year, considerably higher than other oasis agricultural communities. The total fertilizer use in the area is estimated at about 52097-ton 5.1 kg/ha against the national average of 33000 ton. The implications of the rapid agricultural transformation in 1966-1980 on employment, income distribution, class formation and accumulation are among the main concerns of the analysis together with the positive social formation effects of the new technological inputs.

Socioeconomic Factors in Rural Development

The analysis of globalized economic change and its impact on rural development is constrained to study the prevalent understanding of the thinking where publicly available empirical evidence is lacking. It has been examined the rural socio-economic characteristics prevailing in the different segments of West Bengal in India and posed by its district with particular reference to the distribution of small and marginal farmers and the overall and overcrowded rural literates in the context of the variables having disequilibria. Such discourse is accompanied by the socio-political

character of the reported panchayati raj institution which is the lowest tier of the three-tier representative structure and hoped to evaluate or at least give some insight into the sustainability of such a local self-governance system, and the rural upper-class or the aristocracy's effort to have regained power. Keeping in view, the agro-climatic and socio-economic peculiarities of West Bengal, a mixed methods approach is followed in order to investigate the rural-urban disparities with emphasis on rural development.

Initially, 19 districts of West Bengal are selected and further subdivided into 5 categories on the basis of the percentages of farmers who own less than a hectare of land and for which the Plan Areas of Ex-Districts have been prepared. Despite the groupings being considered an upper-limit range there exists a maximum shall then at least 3 sample districts have been studied in depth thereby questioning the perception. The current levels of rural transformation have been gauged for the West Bengal chosen districts based on "most developed", "developed", "moderately developed", "less-developed" and "least-developed", as per the rural transformation index computed from 18 indicators enumerating the situation. Further, the focus area chosen in the developed district of the state to ascertain the progress of such geographical transformation is afflicted with socio-cultural stigmata.

1. Population Dynamics

Population is one of the basic geographical elements, as well as an important intrinsic factor for social and economic development. The transformation from a traditional agrarian society to a modern industrial society will inevitably lead to the changes in the population quantity, structure and distribution. As an indicator of the degree of urbanization, population distribution relates to the allocation of all kinds of resources, and also plays a significant role in guiding the construction of infrastructures, public services and the development of industries. It is of great theoretical and practical significance to analyze the pattern change of population distribution and its influencing factors (Zhang et al., 2020). There is an extensive and profound research foundation in relevant study fields. In terms of population distribution, the socio-economic and natural factors, human activities related to population distribution have been studied. As the research aspects, the methods of spatial analysis of population pattern have accelerated the understanding of population change in various regions. As for population distribution and its influencing factors, research focused on China's urbanization and the changes in cities, villages and towns. However, few studies have attempted to uncover changes in the spatial patterns of rural population and their influencing factors in China. (Cosmina Simona et al., 2017) As for China's rural population, research focused on the changes in rural population and its driving factors, the changes in rural labor, and the decline in the rural population caused by rural-urban migration and the reasons for this migration. Some studies have noted the negative effects of rural population decline in emigration regions. More recently, the division of rural areas and the empty-nest problem in rural families have also been discussed.

2. Employment Trends

"Primary Sector Employment" or "Agricultural Employment" is defined as any employment or self-employment in agriculture, hunting, fishing, forestry and logging, or farming. Primary sector activity may involve the extraction, utilization, and production of natural resources (Eapen, 1999). As expected, primary sector share's shows an inverse relationship with the primary sector employment. However, due to the labor absorbing nature of agriculture, the farm employment trend is expected to decline slowly. The reduction in primary and farm employment is reflected more distinctly in terms of growth rate of employment in percentage terms. After a steady increase of about 1.4 percent, farm employment declined sharply to near zero growth rate in 2005-06. The agricultural employment is also expected to decline at a slower rate but this decline is beginning to become sharper with a decline in the growth rate to less than 0.10 per cent in 2004-05 and 2005-06 (A Reddy, 2012). The state witnessed the steepest decline in agricultural employment in 2004-05 (2005/06). Due to the lagged impact of agrarian distress and manifold infrastructural reversals, especially some of the backward districts experienced a sharp decline in agricultural employment. Araku of Agency area and Kurupam of Parlakhemundi district and other districts of north western zone were few among them. Most of

the fast growing districts of employment growth are from coastal area and include Ganjam, Khurda and Cuttack etc. Sundargarh of north western zone and a new entrant in employment fast growth zone is on the back of growing labor intensive mining and industrial units.

The growth drivers of the state employment rarely showed parallel trend in population growth. Yet, the socio-economic profile of these stages is at stark contrast with near zero growth in Chilika of coastal zone and Sundargarh in northern zone. Those districts having more than 10 per cent population growth by vehicles have of the HDI value of below 0.60, while those with near zero growth are both in the high and low HDI categories. After experiencing more than normal decline (-0.70 per cent) in population growth during 1971-81, the employment growth accelerated rapidly but at a much lower level.

Environmental Considerations

Environmental considerations associated with the agriculture sector in developing countries have lagged those in advanced economies. Many of the environmental issues confronting developing countries today have similar origins to those encountered in their advanced counterparts some decades earlier. Desertification and deforestation are two good examples. There is now an increasing recognition of an enhanced environmental component in the transformation process. In particular, some of the major resources underpinning farming – land, water, vegetation, fisheries, etc. – are coming under scrutiny. And there is now awareness that these resources are being seriously degraded or depleted as a result of farming activities. Much of the early concern revolved around the harvesting or exploitation of resources (R. Anderson, 1970). However, with greater understanding of the physical processes involved, the focus is now very much on the condition of land, its capability to support sustainable agricultural systems, gully erosion, salinity, pollution, carbon sequestration possibilities, etc. In this instance, long-term effects are primarily consequences of less-visible processes gradually undermining the resource base. The results of some environmental interventions constitute much valued public goods at the local (increased production and productive capacity), regional (flood control, sediment settling), and global (carbon sequestration) levels.

Environmental issues are increasingly relevant to farming in developing countries. Strong pressures exist on the part of many low- and middle-income countries (LDCs) to conform to the same types of reform in the environmental domain which many adaptations of the New Right agenda have undergone in the advanced economies. Outside establishments such as the World Bank have been at the forefront of efforts to implement these reforms. In terms of broadly defining government mandates and delineating legitimate policy instruments, among the more important goals in the Bank's analysis of the agricultural sector are sustainable natural resource management, where the emphasis is on promoting security of land and water rights and addressing issues of land distribution; and responding to the challenge of future food security, where the focus is more on price-based policies governing resource allocation, investment, and production activities.

Policy Frameworks for Agricultural Development

Policymaking is often thought of as a linear process involving the identification of a problem, the clarification of goals, options to achieve these goals, and choices among these options (Johnson & Resnick, 1970). This is a working model of policymaking which neglects the many forms of manipulation and chaos that colour the actual process. Extrapolating from this model leads to the notion of the policy cycle and attempts to formalise policy systems. Unfortunately, these systems have turned out to be so complex that they approach the realm of natural systems and therefore collide with the limitations of formalism, given the ambiguity and fluidity of the various boundaries and oppositions involved.

This chapter examines agricultural transformation and rural development, the research objectives, and the conceptual framework proposed for studying it. A geographical perspective is emphasized as "the science of location" which "represents an attempt to understand the world as a surface of ever-changing patterns which form an interdependent whole." It analyzes issues of patterns and trends of agricultural development from a spatial perspective, assessing spatial policy responses which determine outcomes in terms of

equity and efficiency of resource use. Besides the final outcome of policies, the chapter also addresses issues of policy effectiveness and efficiency in a multilevel perspective. It considers synergy effects of various policies within and across sectors, as well as structural conditions like institutions and conflicts that can block or bypass intended policy effects.

Geographical analysis offers insights into the processes shaping observable patterns, as the consequences of environmental perceptions, as principles guiding location choice, zoning, and regional policy, or in terms of land rent and competitive advantages. The study of similarities, continuities, and changes of spatially organized expressions of a substance over time provides in-depth understanding of the origin, nature, and dynamics of objects of interest. Some histories treat continents as patches in an earthly landscape in which tectonic processes determine the geometry, while rivers and winds shape dated principles on a much smaller scale. Others examine the ways people and things have crossed distances, creating regional differences in language, culture, economy, power, wealth, inequality, accessibility, and variability through time.

Sustainability in Agricultural Practices

Sustainability implies a long-term sustainability, a conscious need of the masses to hold on to their life-sustaining resources. Sustainable development therefore, in the context of agriculture, means such agricultural transformation wherein agriculture grows in terms of production (and other socio-economic entities) so as to meet today's needs without compromising future generations' abilities to meet their needs. Most sustainability assessments done so far in Indian agriculture are performance based and have pushed over the years for better management and policies. But these assessments have not considered the flow of environmental, social and industry energy inputs, nor the synergy of sustainability indicators across the three pillars of sustainability. Sustainability assessments need to incorporate a broader range of sustainability indicators and consider sustainability cross-coupling as a system phenomenon (Duro, 2012). The Agroecological Zone (AEZ) and State (or District)-Level types of Indian agroecosystems were used as the primary units to assess. Eight pillars of sustainability were assessed using indicators from a wide range of secondary sources. Weighting was done through expert judgment based Analytical Hierarchy Process. System coupling of sustainability indices across sustainability pillars was assessed through input-output based synthetic community approach.

The northern western and north eastern parts of India are intrinsically more eco-sensitive but presently also exhibit significant sustainability deficit. Land, water and social sustainability deficits are large in that order. Need for transformational shifts in policies and development approaches at the state level i.e. native region is further stressed, with the potential of win-win bargain that can be made by policies targeting sustainability co-benefits along interlinked pressures and susceptibility domains (pressure-sense of controls). There is a growing consensus amongst academicians and policy makers, on the systems understanding of sustainability, its crossing of scales, sustainability synergies, and consequent need for broadening sustainability frameworks and targets beyond technological, carbon, and loss measures. There is absence of lending interest in India in this regard, especially for sustainability assessments in agriculture, which hitherto concentrated more on narrowly-defined performance and input-efficiency measures.

Role of Institutions in Rural Development

One of the major channels through which trade liberalisation policies impact on poverty, affecting rural livelihoods, is through their impacts on agricultural production, marketing and processing. The success of agricultural production responses, including trade-related investments in technology and marketing, will depend on appropriate institutional conditions. This means greater attention must be paid to the host of institutional issues relevant to agricultural production, ranging from horizontal organisations, including producer organisations, to vertical organisations, such as marketing and processing institutions. Institutions actually matter for development and poverty alleviation, but in ways which are under-researched and poorly understood. In particular, insufficient attention has been paid to institutions and incentive regimes affecting production and marketing responses.

Evolving desirable and feasible rural institutional development pathways, which meet local and wider multiplicities of objectives, interests and views, is seen as key; (Dorward et al., 1970).

A theoretical framework is provided for analysis of the processes of rural institutional change in terms of actor-level changes in perceptions, interests, knowledge, resources and capabilities, and in organisational arrangements and government and inter-organisational structures that affect relationships and interactions among social agents. Analysing the linkages between agricultural development and poverty alleviation has implications for the type of targets in terms of 'outcomes' which are chosen in evaluating projects, programs and policies. Identification of links between agricultural development and poverty alleviation is generally relatively straightforward. Policy responses are much less straightforward as the range of potential interventions is wide; systems of analysis are needed to identify and focus on a limited range. It is important that investments and policies are adequate to ensure rapid and rigorous achievement of production responses in order to stimulate the domestic production of agricultural commodities. Adequate agricultural price interventions may also be necessary.

Gender and Agricultural Transformation

The topic of gender and agricultural transformation is approached in this chapter by considering how gendered changes in access to land and other productive resources reshape the control women exert over these resources, and how this, in turn, affects their asset-position and rural livelihoods. Attention is paid at the outset to a number of neglected issues surrounding the links between gender and agricultural transformation. First, is agricultural transformation that takes places via changes in land tenure arrangements and the impacts of this transformation on women. A limited understanding of how different resource control proxy indicators interact in influencing women's control over agricultural resources limits mainstream quantitative comparative agrarian studies. Exploration of different dimensions of gendered control is important for several reasons. First, normative debates on women's empowerment call for a more nuanced understanding of intra-household power relations beyond equitable access and ownership of resources. Additionally, research and policy that approaches women in agriculture needs a better understanding of how diverse and complex the resource use, access and control situations of women, men and their activities are.

The second major concern taken up in the chapter involves linking improvements in women's land rights and agricultural productivity changes to improvements in women's welfare and other developmental outcomes. Increased attention is given here to how socio-cultural processes impact women's control over agricultural resources as pathways to welfare gain from agricultural productivity improvements. The economic objects of focus here are women's land rights and their access to extension service advice, farmer trainings, and inorganic fertilizer usage.

Recent evidence on the decline of landownership inequality by gender is overwhelmingly derived from research within the social sciences. Pressing, scholarly concerns remain however about the nature of changes in land transfer arrangements that co-exist with declines in inequalities by gender in land ownership within the same countries. Case study approaches to understanding such land tenure transformations have been the focus of far less attention.

Globalization and Its Effects on Rural Areas

In the past decades, multiple global changes have influenced rural areas on the world. Individual localities and regions must confront great opportunities and challenges, under a broad backdrop of increasing interdependence. Globalization affects a wide range of areas. Employment opportunities are altered, income levels raised or depressed, local service provision patterns changed, and environmental risks increased (Da Silva Machado, 2017). New processes of spatial transformation in the rural environment continue to emerge, further strengthening the importance of geography. Meanwhile, traditional farming and its role for rural resilience more broadly are under threat. In recent years, researchers have displayed an interest in understanding the dynamics of rural spaces in developing regions of the world. These regions are also affected by global processes, but in very different ways compared to the developed world, and the sum result is great global spatial diversity.

At the same time, the recognition of the growing importance of a global understanding within rural research has led to a dismantling of the separation between rural research on the global north and rural research on the global south, and the promotion of more transnationally comparative research. As a consequence, the rural spaces need fresh perspectives and studies exploring their situation and dynamics, especially in the light of globalization. The repercussions of the challenges for rural areas in the developing world in the early twenty-first century have received far less theoretical and empirical attention. The complexity of the spatial restructuring present in the developing world in the era of globalization contributes to better understanding the contemporary rural, going beyond the view of inert spaces only subject to external interferences. Globalization, Rural Change and the Social Adjustment Problem in the Developing World. Rural transformation in the global world as a hybrid and contested process, that involves actors and forces operating at multiple scales, and which echoes elements of rural restructuring in both the developed world of Europe and North America and the developing world, yet with distinctively different characteristics.

Food Security and Rural Development

In recent years food security has been recognized to be a complex set of economic and social processes involving rather than simply a matter of the availability of food. 'Food security is traditionally defined as access by all people at all times to enough food for an active, healthy life (G. Hyman et al., 2014).' More recently, 'Food security is generally agreed to comprise three main elements: (i) food availability, (ii) food access legitimacy analysis, and (iii) stability of the two.' After a brief review of the development of the food security concept and developments in rural development, the paper discusses the question of food security as an element of rural development theorization and planning, with special reference to its geographical aspects. 'Human beings existed for thousands of years chasing animals and gathering plants before they learned how to till the soil and grow things.' It is believed that the earliest man was a fruit-eater and was highly dependant on naturally growing fruit trees. Plus, or minus 6 000 years ago in the so-called fertile crescent, cites of wild cereals were established. 'There men learned to sow grain, harvest, and grind flour. Agriculture started to take foothold, it became prime need just as sex, to survive.' No sooner men learned to till the soil than they began to settle down and adopt communal living at the hub of waters and soils. Food production became food supply. Set food supply at hand, smoothly formed either exogamous or endogamous systems of food distribution. Such systems at the individual level gave rise to a larger sustainable system in one or a few settlements, let alone regional network systems in cities and towns.

Challenges Facing Agricultural Transformation

A fundamental question in the study of rural development in Africa and elsewhere is whether agricultural transformation can be separated from other socio-economic changes in rural areas. On the one hand, the evidence from experience with agricultural transformation suggests an inextricable link between changes in agriculture and those in other sectors, including population size and distribution, ownership of land and other agricultural resources, technology use patterns, income distribution, consumption patterns, organization of production, marketing and services, and governance systems. On the other hand, the need to focus on agriculture, at least at the initial stages of economic development, has based the argument that agricultural transformation can occur independently of other changes in rural areas. This emerged from the notion that modern agriculture is a well-organized set of inputs, outputs and/or processes which can be transferred, with a little alteration, from one historical, cultural, economic and environmental setting, to another. However, history and experience have shown that agricultural transformation is neither a pre-determined nor a pre-ordained process. The absence of one or more elements of agricultural transformation does not imply that the process of agricultural transformation cannot be realized. However, the absence of some essential elements may imply certain conditions such as the duration, pace and/or effort that is a different aspect of rural development intervention (Sisay Asefa, 1988). Many of the structural features resulting from underdevelopment, as well as the policies and process that contributed to it, may also serve to

impede development during the transition periods. For example, inequalities in the distribution of land, agricultural investment, storage, processing and transportation facilities, as well as in the provision of public services, are widely viewed as constraints on agricultural transformation. Furthermore, many of the institutional arrangements and relations which are a result of colonialism or which presently exist in Africa, even if beneficial at one time, have changed in character and are now perverse in their effects on agricultural transformation. Whether they are land tenure or cooperative arrangements, social hierarchies or governance systems, they are often viewed today as impediments to development.

1. Climate Change

Current estimates predict a greenhouse gas concentration of approximately 1,400 ppm CO2 equivalent (CO2e), leading to a 2.5ºC rise in average global temperature. This is likely to have significant impacts on the agriculture of various regions. Simple approaches use temperature and rainfall effects on production systems derived from statistical crops models to quickly predict country and global impact. However, crop growth and other geophysical processes are more complex, especially in developing countries, where these approaches do poorly. More complex simulation models with geornorphological and biophysical mechanisms are needed to scale down to site or farm level. Biophysical crop, soil and climate variables modeled over time by the well-tested (L L Gowda et al., 2008) emulate farm systems and predict impacts on agriculture, hydrology and land use. Such models have become useful tools to analyze impacts, adaptions and mitigation to climate change on field and farm level. Global output is inconsistent with local policy knowledge and theories about why countries differ in their responses, compromising impact predictions and analyses of the policy and knowledge milieu in which they are embedded.

The most recent trend in scientific outputs in Agriculture and Forestry subject areas regarding climate change is presented. It includes the overall number of documents on climate change and its effect concerning agriculture. Special attention is directed to the keywords used and to the journals in which climate change articles appear. This trend provides very useful insights into the climate change research in Agricultural subject areas. The trend includes the journals involved and a list of the most frequent keywords or words used. By way of example, the food security problem in some countries shows the interaction of keywords and journals, illustrating the network of collaboration between countries. The analysis focuses on the trend during the decade 2005-2014, and below is a discussion of a significant thematic issue (Aleixandre-Benavent et al., 2017).

2. Market Access

A major part of the empirical analysis of rural development is directed at rural-market surroundings, broadly-defined to embrace adjacent places and means of export. Certain physical-relief analysis is stressed with the troublesome Himalayan piecemeal, and with the distribution of available means of transportation. The whole subject is theoretically interlaced with a more fundamental consideration of money and markets — an analysis of market stability and equity, together with a consideration of the continuously-recurring problem of conversion into money and back. Important currents of investigation are suggested with the hope of their profitable pursuit. Several portions of the subject have been the topic of previous publications, but it is believed that the major part will be made sufficiently novel and little-burdened with earlier publication. The questions propounded are by no means esoteric, student's problems, calculated to prevent rather than promote advance in the science of practical agriculture. The topic is of primary importance and would make an interesting reading. It is a subject whose fruitful investigation is bound to bring material gain to millions of human beings, and whose study may afford the broadest possible basis for understanding human tendencies and conduct. It is also an easy subject to judge. There is doubtless a popular tendency to disparage the importance and value of country life with some modern residential city, —at least for final and productive residence. Wider angles of human observation are certainly necessary for the cognisance of social, religious, and ethical ideals and movements. Within the past six months, rural-market surroundings of less than one square mile have been personally investigated, with the assistance of numerous gaily-footed assistants; while advantage has been taken of the persistent energy of a friend for the more distant wisps of possible information. Hence it is hoped

that these remarks may be of interest to one or more persons of an inquisitive turn of mind. To arrive at a correct interpretation of rural-market surroundings, might it not be logical to start with an ideal or classic market, and, on the basis of it, analyze and critically view the surroundings of actual markets. At the outset a few qualified statements concerning markets in general are made. The essential conditions of all rural-marketing are the fairly ample supply of goods to be bought and sold, the complete determination of prices by supply and demand and the provision of adequate means of export at a reasonable cost. In the case of agricultural markets there is the additional condition of connection with the indifferent upper, outraged numbers. The upper outraged numbers are necessarily composed of metropolises and industrial centres with which the rural markets must have communication for the exchange of commodities in commerce longer than local.

Future Trends in Agriculture

Remote sensing (RS) and geographic information systems (GIS) have become fundamental tools in the evaluation, monitoring, and management of dynamic land use and land cover (LULC) change scenarios over large areas for integrated sustainable management of natural resources (Duro, 2012). Grounded in dual research themes, this chapter aims to give a brief overview of what seem to be the most pressing challenges and expectations facing agriculture over the coming decades. The main objective is to review the main prior trends in a number of relevant areas and provide insights, where available, into future prospects, acknowledging that uncertainty grows when attempting to look further into the future.

Historically, food and agriculture have had a priority role in the development of nations. In the mid-twentieth century, the era of high expectations and optimism regarding the rural and agricultural development at the global level emerged. In retrospect, with benefit of seven decades of experience, there has been overall success, albeit mixed with diversity in results and expectations by region (Bianco de Carvalho, 2016). Considerable increases in average food production, productivity, and consumption have been achieved over this period. From a food-deficit region in the 1960s, with pending famines, India has in a few decades become self-sufficient, with food production growth surpassing its population growth. China has achieved similar success. In many other developing countries today, food deficits are being experienced at the national level, notwithstanding gains in production at the farm level. Moreover, in a particular aspect of success, food production growth has kept up with population growth, and average consumption per capita has continued to rise in even the lowest food consumption countries.

The chapter also acknowledges the increasing importance of cross-sectoral analysis in addressing key and complex challenges for food security and agricultural development. Agriculture, rural development, food security, and nutrition problems are closely interlinked. The present note attempts to provide, on a sectoral basis, analyses of three major questions: what may happen in terms of food and agricultural demand and trade developments, supply and technology prospects, and rural and agricultural development in low-income economies. By their nature, these questions are far-ranging, complex, and uncertain. Although attempts are made to address these challenges in their own right, at the same time it is recognized that approaches which consider the interlinkages and uncertainties associated with the agriculture and development problems are increasingly warranted.

Community Engagement in Rural Development

Development is the consequence of the interplay of the component parts of a nation and in the latter part the degree of its impact is a function of the national development paradigm: the approach that actively nourishes all forms of development. Local government districts and city wards are the operational political units for governance decentralization and rural development. Thus, the basic condition for rural development in the future would be the adequate operationalization of community engagement development approaches.

While Globalization may hinder growth and aggravate poverty in rural areas of a nation, it must be recognized that if properly harnessed; globalization could equally be utilized for the growth and development of rural areas in developing countries. However, absent good

political and market institutions, there is the grave danger that globalization can hurt the poor and lower classes, intensifying their already grim plight. In partnership with the initiatives of government and the private sector, the engagement of the rural poor in the discussions, decisions and interventions that directly affect their lives is a condition for basic rural improvement. Community engagement on rural development is the means by which the rural poor can advocate for their priorities through the articulation of their needs within the transformative larger rural development agenda. Community engagement is the process of building constructive relationships between local government and community-based organizations, so as to develop social capital and collaborative decision making on issues of concern to communities.

A fundamental aim is to strengthen local government responsiveness to communities, so that communities have greater opportunities for participation in decision making concerning their social, economic and physical environment. In addition, community engagement requires that rural people are granted a greater role in the decision-making process of the local government districts and city wards. The need to find a workable mechanism for the engagement of rural people in the decision-making process of local government and their capacity building, if necessary, in order for rural development to be inclusive, has been pressing on policy makers for over a decade.

Role of Education in Agricultural Transformation

Educational development has become a prerequisite for the agricultural transformation of rural development. There is no doubt that people's perception of modernity and scientific knowledge is influenced by education. It is observed that the illiterate person is limited to old traditional agriculture. Education gives knowledge, an inquisitive mind, intelligence, and research aptitude, while agriculture provides life to the people. In the modern farming system, modernized and scientific farming is needed. Therefore, agricultural education becomes very important. The role of education in agricultural transformation and rural development may be stated as follows (M. Luvalo, 2014).

Rural Development with a Comprehensive Perspective: Agriculture is a profession that is strongly related to culture. In order to understand the agricultural system of a country, one needs to understand the culture of that country. Some of the existing education systems in developing countries mainly have a technical perspective. Development must encompass a much broader perspective either with economics, sociology, infrastructure, or other reflections on past and current research problems. In this respect, agricultural education is deficient and continuing education programs on a broader perception are needed on priority basis.

Rural Development without a Holistic Dedicated Approach: There is a growing realization in the so-called developed world that rural development is an integral part of national development. Agriculture is a semi-rural economic activity. Agriculture and irrigation work on a large-scale employing staff with interdisciplinary skills. There is relocation of technical and managerial personnel from urban areas into rural areas, a need for trained personnel on the above lines and specialized rural development agencies. Hence the need for Agricultural Education is felt.

Rural Non-Farm Economic Activities: Diversification of the rural economy has to be viewed in all its aspects with interrelated items of local importance. The potential areas of activity include rural industries, handicrafts cottage industries, woolgrowing, wool producing and processing, fruit and vegetable growing etc., which have not hitherto been together sufficiently looked into with a productive objective would come under the purview of Agricultural Education.

Technological Innovations in Rural Areas

Rural industrialisation can contribute to a process of combined (i.e. simultaneous, horizontal and vertical) and uneven (i.e. differential) regional development. Discussing and investigating a substantive case – South Africa – the importance of ‘terriers’ (i.e. social structures) and ‘technologies’ (i.e. actions, instruments) in attending to this complexity is highlighted. A case is made for a socio-spatial theory of rural industrialisation that could inform comparative research in rural development geographies elsewhere. First, the general case of a combined and uneven rural industrialisation is explored. Then, the South

African case is elaborated upon – with a focus on the roles of terriers and technologies in attempting to combine rural industrialisation with rural equity. Following this, the South African case is discussed more abstractly, with a focus on the emergent socio-spatial theory of rural industrialisation.

Social differentiation in rural regions is often interpreted as the outcome of uneven rural development. Emphasising spatiality and history, interest is in how and why uneven rural development equates with diverse social formations in an apparently homogeneous space. While material terrain is certainly significant, social structure is also relevant in mediating how the physical landscape is built and redeployed. Type, density, distribution of built environments affects daily life and vice versa, supporting and/or opposing new economies.

Territories are accorded shapes and scales by processes and also act as co-constituents of social structures. Terriers evolve and mediate territoriality, fracturing and reproducing social order. This selfishly inadequate character of socio-spatialities, ultimately reducible to the biased activity of human agents, has a potential advantage for social theorising – an object and source of conception and empiricisation. Avoiding a boundary realist/constructionist dichotomy, theoretical attention can be directed towards the social structures which operate on space, while remaining sensitive to the non-deterministic effects of space on social action, and to contingencies in social structure. This consideration suggests a direction for theorising uneven development, creating a similar point of connect of both spatiality and history.

Conclusion

Agriculture is as old as civilization, and agriculture and related activities are the bedrock of rural life in most countries. It remains an indispensable part of the livelihood of the inhabitants in both developed and underdeveloped countries, irrespective of their economic and productivity levels. With rapid development and industrialization, the rural population in many developing countries is migrating to the cities for better economic opportunities, putting immense pressure and stress on the cities. Unfortunately, in many developing countries, agriculture is still a means of livelihood without taking it as a business or an industry, and this has become even more pronounced due to the progressive ill-effects of globalization (Da Silva Machado, 2017). By the 1980s, the emphasis of development paradigms shifted from a focus on the accumulation of large-scale, capital-intensive means of production to a set of processes replete with local labour-intensive small-scale low-cost alternatives. This shift, which has subsequently been termed 'development from below', has been widely represented by the concept and practice of sustainable livelihoods. Within this framework, the traditional understanding of the farm household's role in rural development has been extended beyond the production and consideration of agriculture and natural resources to a systematic comprehension of the interrelationships between the agricultural and nonagricultural sectors.

Agricultural production includes the cultivation of crops and livestock rearing, including poultry, goat rearing, dairy farming, fishing, etc. Agricultural production is differentiated in terms of cultivation of crops and livestock rearing. Crop cultivation includes cereals, pulses, oilseeds, fruits and vegetables, and other crops like sugar cane, jute, etc. Livestock rearing includes cattle, buffalo, goat, sheep, pigs, poultry, and setting up hatcheries for both desi and broilers. To make the system more holistic, value addition after the production of the farm produce is also included. Sugar and jaggery manufacturing, milk processing, bakery product manufacturing, and agro-processing on banana, ginger, and turmeric are considered value additions. These activities are broadly classified into agricultural and support activities. Agricultural activities include crop production (irrigated and rainfed), dairy farming, and other livestock production. Crop production, dairy farming, and poultry are the three main agricultural activities. Building comprising exclusive farm tepid transit and other allied stores for storage of the farm produce, hotels, and guest houses for agro-tourism has the potential for rural development and local agricultural production.

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Conflicts of Interest

The author declares **no conflicts of interest** related to the content, methodology, or publication of this research.

Ethical Considerations

All procedures performed in this study involving human participants were conducted in accordance with ethical standards. Informed consent was obtained from all participants prior to data collection. Privacy and confidentiality were strictly maintained throughout the research process, and no personal identifying information has been disclosed.

References:

1. Da Silva Machado, F. (2017). Rural Change in the Context of Globalization: Examining Theoretical Issues.
2. Ionel Bucur, S. (2017). Complex Development Alternatives in South-Muntenia Region – Prospective Assessments.
3. Van Zyl, J., Sartorius Von Bach, H., & Kirsten, J. (1993). Internal Environment: The Agricultural Sector in Region E.
4. Bonger, T. (1970). The New Technology: Agrarian Reform and Peasant Differentiation in Ethiopian Agriculture In 1966-1980, With Special Reference to The Arsi Region.
5. Zhang, H., Zhang, S., & Liu, Z. (2020). Evolution And Influencing Factors of China's Rural Population Distribution Patterns Since 1990. Ncbi.Nlm. Nih.Gov
6. Cosmina Simona, T., Malgorzata, Z., Andrea, F., & Malgorzata, M. K. (2017). Rural Areas from Demographic Perspective: Study Case Poland and Romania.
7. Eapen, M. (1999). Economic Diversification in Kerala: A Spatial Analysis.
8. A Reddy, A. (2012). Structure Of Employment in Rural India.
9. R. Anderson, J. (1970). Environmental Issues and Farming in Developing Countries
10. Johnson, M. & Resnick, D. (1970). Strategic Analysis and Knowledge Support Systems for Rural Development Strategies in Sub-Saharan Africa.
11. Duro, D. (2012). Remote Sensing and GIS In Support of Sustainable Agricultural Development.
12. Dorward, A., Kydd, J., & Poulton, C. (1970). Institutional Dimensions of Trade Liberalisation and Poverty.
13. G. Hyman, G., Larrea, C., & Farrow, A. (2014). Methods, Results and Policy Implications of Poverty and Food Security Mapping Assessments.
14. Sisay Asefa, E. (1988). World Food and Agriculture: Economic Problems and Issues.
15. L L Gowda, C., D Dar, W., & A Kumar, A. (2008). Coping With Climate Change in The Semi-Arid Tropics.
16. Aleixandre-Benavent, R., Luis Aleixandre-Tudó, J., Castelló-Cogollos, L., & Luís Aleixandre Benavent, J. (2017). Trends In Scientific Research on Climate Change in Agriculture and Forestry Subject Areas (2005-2014).
17. Bianco De Carvalho, L. (2016). Prospects For World Agriculture Towards the Near Future.
18. M. Luvalo, L. (2014). The Role of Higher Education in Social Transformation and Rural Development.