CESS Foundation Day Lecture 5

Transforming Agriculture for Challenges of 21st Century

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Role of agriculture in India's development hardly needs any elaboration. However, this role needs to be re-oriented in the light of changing environment and requirement and to meet the new challenges, and, also to harness new opportunities. This will require a shift in our approach and thinking towards agriculture from "pushing for incremental change" to "promoting for transformation".

Agriculture is at the nexus of three of the greatest challenges of the 21st century – achieving food and nutrition security, adaptation and mitigation of climate change, and sustainable use of critical resources such as water, energy and land. Agriculture is also acquiring renewed importance for gainful employment due to inability of manufacturing sector to offer jobs to keep pace with growth in workforce.

India's achievements in agriculture sector, though impressive in some areas and states, have remained lower than the potential. The main reason for this is the complacence of our leaders, particularly research leaders, with our achievements. We generally compare our contemporary food situation with the situation of food scarcity of mid 1960s and draw satisfaction from the fact that now we are not facing food scarcity. Our mindset is fixed in comparing agriculture of 2000s or recent years with agriculture of 1965-67 rather than comparing agriculture achievements with the achievements of India's other sectors and other nations. Between 1965-67 and 2000s, we are much more different in all sectors and spheres of life than in agriculture but we do not want to assess achievement of agriculture against the challenging yardsticks. Surely, agricultural achievements are big compared to mid 1960s but they look dwarf compared to other yardsticks. What has been achieved in agriculture is not compared with what is achieved in space, IT, telecom, services, automobiles, medical science, transport.

The present government has set vision for New India that involves *"Sabka Saath Sabka Vikas"*. Transformation of agriculture sector is crucial for achieving this vision as 45 per cent household in the country depend on agriculture for their employment and thus livelihood. There is large gap between income of agriculture workers and non agriculture workers. Poverty and under nutrition in the country are concentrated among agricultural labour and small and marginal farmers. There is lot of concerns relating to rising rural distress. If current trends in agriculture are not changed there will be little improvement

in reducing income gap between agriculture and non agriculture income and alleviating rural distress. Beside inclusive growth, agriculture matters for health and nutrition, sustainability, climate change and quality of life in the country. All these factors underscore the need for a new vision for agriculture as we move forward in the 21st century. Some aspects of the new vision for agriculture are discussed below by grouping these in following heads.

- Growth to efficiency
- Employment Generation
- Food Security to Nutrition and Health
- Shortage Management to Surplus Management
- Production and Producers
- Input Intensive to Knowledge Intensive Agriculture
- Supply to Demand Driven Production
- Climate Change and Sustainability
- Policy Interventions, Regulations and Reforms

Growth to Efficiency

Since 1970, agricultural output and value added in agriculture in India moved on a growth trajectory of around 2.75 per cent in most of the period. In some short periods the growth rate moved to 4 per cent but this growth followed large shift in terms of trade in favour of agriculture and thus brought formidable challenge of high food inflation. It may appear strange that high growth did not bring down real prices in the country. The reason is that prices have driven output growth rather than output growth determining prices! Some research shows that during the period of high agriculture growth (above 4 per cent) almost half of it was driven by increase in agricultural prices. Thus, if agricultural prices do not rise faster than other prices, there remains a danger that growth rate of our agriculture will collapse, which then become a major cause for agrarian distress and adverse effect on overall economic growth. Thus, a formidable and foremost challenge at present is how to (i) sustain agriculture growth without letting food price inflation rise beyond acceptable limits and (ii) incentivize farmers to raise production without causing hardship to consumers? This requires shift in emphasis from growth to efficient growth.

In most of the crops, increase in productivity has been accompanied with increase in average cost of production which necessitates increase in output prices to keep incremental

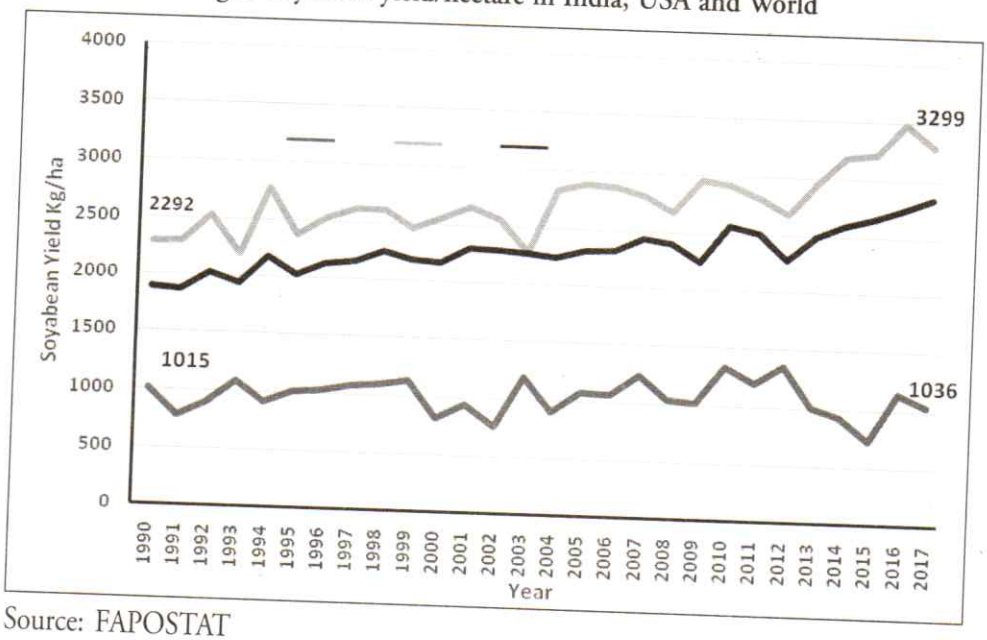
production profitable. There is a need for shift in strategy from 'growth to efficient growth' such that increase in productivity is associated with reduction in average cost of production. This requires upgradation of agricultural technology, application of modern skills in farm practices, new innovation in farming, and lowering wastages in use of fertilizer, water and other inputs.

Seed replacement rate indicate that use of certified quality seed distributed by various agencies is quite low. Fertiliser use in most of states is sub optimal. More than one crop is grown on less than 50 per cent of area under cultivation. Improved technology has not yet reached large number of farmers which is evident from the fact that more than 30 per cent area under cereals is under traditional varieties. The main reasons for this are poor extension, missing link with supply chain of quality seed and quality plant propagation material and low availability of institutional credit in many states. Supply of low quality and spurious inputs is an important factor for increased cost without adequate gain in productivity. Thus, beside emphasising use of modern inputs there is a need to put in place effective mechanism for monitoring and regulating quality of inputs like seed, fertiliser and agro-chemicals.

Efficiency is driven by strong and vibrant R&D by public or private sector. Public sector R&D in the country is showing a fatigue and suffering from resource constraint, disciplinary fragmentations, and lack of drive and inspiration. Private sector investment in agri R&D is also low due to nature of IPR regime in the country. Consequently, the gap between domestic and global agricultural innovations is rising and many fascinating changes experienced in global agriculture are missing in the country. Without domestic R&D attaining global standard, there is need to facilitate easy access to our farmers to global technology, seed, germplasm and other knowledge products.

Application of biotechnology in agriculture through genetic breakthrough and genetic enhancement, will play an important role in shaping future of agriculture. Agri biotechnology has occupied a back seat after the restrictions imposed on field testing and non-release of Bt brinjal in the country. The countries which have embraced Gm and Genetically engineered technology are gaining advantage in terms of productivity and cost. Trend in soybean productivity in north America and India present a stark example of competitive advantage gained by north American countries through agri biotechnology (fig 1). India would need to take a call on development and acceptance of biotech products vis a vis going back to indigenous technologies by looking at their future prospects.

Fig 1: Soyabean yield/hectare in India, USA and World



Source: FAPOSTAT

Employment generation

Traditional theories of economic transformation clearly established that share of agriculture in national income and total employment follows declining trend with the progress of economic development in a country. This has been experienced by most of the countries as far as share of agriculture in national income is concerned. However, work force employed in agriculture did not keep pace with the decline in share of agriculture output in total output and this created serious structural imbalances between sectoral composition of output and employment. Recent developments in the field of technology like automation, AI, big data, IOT, machine learning are further restricting the capacity of non agricultural sector to absorb work force shifting from agriculture. This has put renewed focus on agriculture to create gainful employment in post harvest value addition activities.

Successive surveys on labour use and employment provide empirical evidence which is against the common perceptions on employment in agriculture. There is large scale withdrawal by female labour from agriculture which shows defeminisation of agriculture rather than feminization of agriculture. Two, withdrawal from agriculture by cultivators has sharply decelerated while shift of agriculture labour from the sector has accelerated. The concerns about threat to agriculture due to youth not staying in agriculture is

belied by NSSO periodic labour force survey 2017-18. Three, youth willing to leave agriculture are seeking middle income jobs but in many cases do not have required skill and capability.

Labour intensive medium, small and micro (MSME) enterprises seem to be an appropriate alternative for rural employment generation. Linking processing to production through efficient value chain, contract farming and direct linkage between factory and farm offers considerable scope for rural employment generation as well as raising farmers' income. An important reason for slow transformation of Indian agriculture and low price realization for farmers is slow growth of food processing sector.

In the wake of capital intensive production preferred by manufacturing sector and anticipated threats to jobs posed by emerging technological innovations there is a need for a rethink on pursuing traditional development approach of shifting workforce from agriculture to manufacturing and services. India should explore possibilities of creating blue collar jobs in and around agriculture. This also looks desirable as withdrawal of labour from agriculture has already started affecting some farm activities and farmers income adversely and there is serious shortage of skilled workers in agriculture needed for specialised operations and adoption of modern technology.

The reasons for workers preferring to move from agriculture to non-agriculture are low wages, stress of manual work and irregular employment. These three problems can be addressed by innovative approaches in production and post-harvest activities. These can be harnessed by developing and promoting new farm models based on knowledge and skill based agriculture and post-harvest value addition at farm itself. PMKVY can play a major role in this by promoting and imparting skills required in modern agriculture, value addition and primary processing.

Food Security to Nutrition and Health

Our per capita intake and net availability of foodgrains, which are basic food, in recent years is only marginally higher than what it was in 1961 and in early 1970s though it is higher compared to the shortage years 1965-67. Our cereals surpluses are result of decline in per capita consumption of cereals in the country, and low use of cereals as feed. We are a unique country to offer surplus for export with such a low domestic intake of food. Our dietary habit of low food intake did not throw serious challenge to raise agricultural production to levels much higher than what has been achieved. Thus, low food intake in the country and low benchmarking representing two years of food shortages have given us false sense of achievements in agriculture and resulted in a complacence (see Annex 1 for international comparison).

India's nutrition indicator and child health indicators are low. According to FAO largest number of people who are hungry or undernourished live in India. IFPRI in its annual publication "Global Hunger Index" shows India in very poor light year after year. All this despite the fact that India has become largest rice exporting country with about 10 percent of our rice production sold in overseas market. For many years in a row we are also having excess stock of rice and wheat which can't be disposed without incurring heavy loss and depressing open market prices.

The present and projected level of aggregate demand for food commodities is presented in Table 1. India currently produces about 726 million tonnes of food to meet the food demand of 1.3 billion people. Three-fourth proportion of this comprises food of plant origin (cereals, pulses, edible oil, sugar, fruits, vegetables, condiments and spices, tea and coffee) while the remaining one fourth comprises food of animal origin (milk and its products, meat, egg, fish). Agriculture will be required to produce 40 per cent more food in next 15 years to meet domestic demand which implies 2.3 per cent annual growth. In case the country harnesses the export market and raises agricultural export share in GDP from present level of 12 per cent to 20 per cent, then the required annual growth turns out to be 2.64 per cent. These increases do not look very high when compared with the achievements of the last 50 years. Since 1965, agri-food production in the country has risen 400 per cent and in the recent 15 years the increase is 52 per cent despite no increase in the area under cultivation. This growth resulted mainly from intensive cultivation, increase in use of fertilizer and chemicals, higher use of water and irrigation, and improved seed and technology.

Table 1: Current Production and Demand for aggregate food commodities towards 2031-32.

Current food production 2015-16	726 million tonnes
Annual growth in demand in next 15 years	2.30 per cent
Total increase in food requirement by 2031-32	40.7 per cent
Quantity of food required by 2031-32	1016 Million Tonnes

The challenge comes from composition of food and meeting nutrition requirement. There is also talk about fortification of food to improve nutrition intake while options for biofortification show promising results in some crops.

Preference of Indian consumers is shifting away from cereals towards horticultural and livestock products. The lowest growth in demand is projected in the case of cereals. However, production strategy and policy of the countryremain strongly favourable for

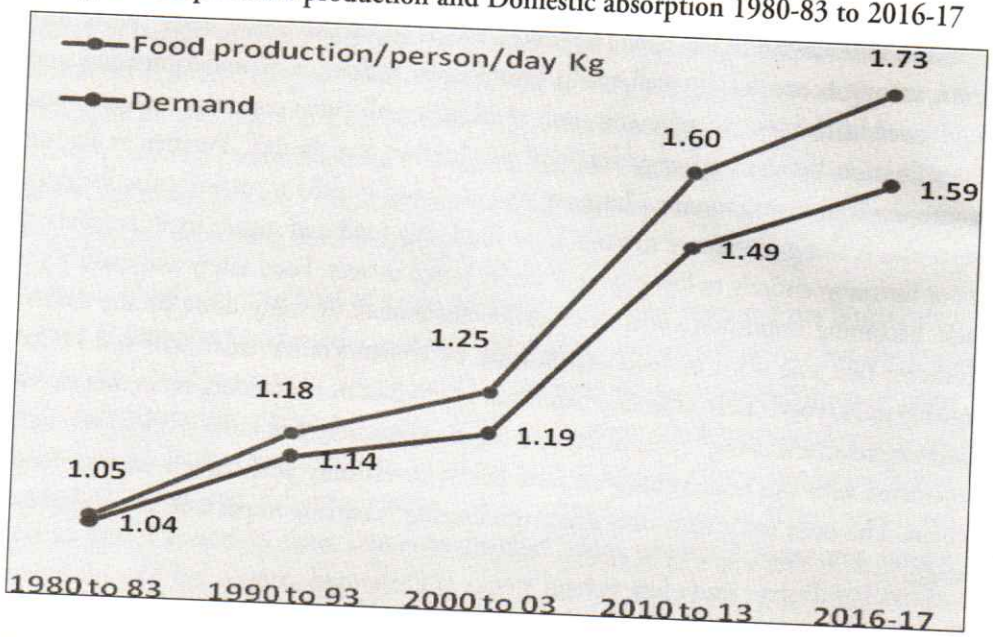
cereals. The other serious concern relating to nutrition and health is that dietary trend indicate shift towards spicy food, oily food and sugary food. Some study shows that even among economically well to do households, incidence of undernutrition and underweight children is quite common. Addressing all these concerns requires close coordination between strategy for food production and health. Further, nutrition awareness is very important to improve nutrition and health, as, major cause for poor nutrition is rising preference towards spicy food, oily food and sugary food; attributing poor nutrition entirely to low paying capacity is not correct. Food safety and quality are also becoming important considerations for consumers. A study done by the author indicate that one third of food expenditure by consumers towards 2050 will be for quality traits. Food safety, especially before sale of produce by the farmers, is not monitored and inspected effectively. Food Safety and Standard Authority of India (FSSAI) which is entrusted with the responsibility of food safety, covers only post harvest stage of food chain. The need for quality and safety monitoring is equally important in pre-harvest stage.

Shortage Management to Surplus Management

Data for the past three and a half decades show that domestic absorption of food has grown at a lower rate than domestic production. In early 1980s, India produced and consumed a little more than 1 kg food per person per day. The production has gradually increased to 1.73 kg. in recent years whereas domestic absorption increased to 1.59 kg. This shows that food surplus (domestic production less domestic absorption) has been continuously increasing for the last 35 years. This require a complete shift in food policy from shortage management to surplus management. This also indicate that much of the under nutrition in India is not due to availability of food but it is due to low food intake by Indian consumers. There is need to address the reasons underlying this. In any case, India has to look for overseas market to dispose rising food surplus.

Agriculture production in the Country is growing by about 2.9% per year. Domestic demand is projected to rise by about 2.3%. Therefore, surplus available for export will further grow in the coming years and India will be required to sell higher proportion of domestic production in overseas market. This requires export competitiveness. India need to act in three areas to achieve this. One, prices in primary markets should not be higher than international prices. Two, price spread should be reduced. Three, producers should be integrated with global value chains. In any case, future growth of agriculture will be significantly affected by exports.

Fig 2: Percapita food production and Domestic absorption 1980-83 to 2016-17



Production and Producers

Till recently, increase in agri-food production remained primary focus of agricultural policy and strategy. This strategy did not specifically target improvement in farmers income and supply of food to consumers at competitive price which are important for welfare of farmers and consumers respectively.

The transformation of some sectors of Indian economy following economic reforms in early 1990s lifted growth rate of total economy from 4.2 per cent during 1971 to 1991 to close to 7 per cent after 1991. This helped in doubling per capita income at constant prices (2004-05) in just 17 years as compared to 37 years before 1991. However, agriculture sector, which comprised over 40 per cent of Indian economy and 59 per cent workforce in year 1991, did not experience any permanent change in its growth rate. GDP of agriculture and allied sectors doubled in about 23 years before 1991 and it took same number of years to double again. Even recent years show that agriculture growth is stuck around long run average of 2.9 per cent whereas non agriculture growth hovers around 8 per cent. The higher growth rate in non agriculture sector has been accompanied only by a small shift of farmers to non farm occupations. Consequently, the income of cultivators (farmers) has remained low and the gap with non farm workers has enlarged. A cultivator (farmer) earns less than one third of the income of a non farm worker. This is major source of rural distress as well as also diminishing interest in farming, which has

serious implications for future food security of the country. Special focus is needed to raise income of farmers at faster rate like "Doubling Farmers Income by 2022". This requires transformation of agriculture production as well as marketing through a multi pronged strategy that involves increase in productivity, reduction in average cost, better price realization for farm produce, expansion of allied activities and shift of farmers to non farm occupations.

Input Intensive to Knowledge Intensive Agriculture

Indian agriculture is missing the state of the art technology and modern method of farming. Advance world is moving towards precision farming using sensors and other scientific tools for exact practices and application of inputs. It saves costs, reduce environmental effect and yield more and better quality produce. We still continue to use flood method of irrigation, broadcasting fertilisers, and indiscriminately spraying chemicals whereas advance countries are shifting towards use of sensor based application of inputs based on actual requirement of plant. Application of advance science at farm level requires skill, knowledge, investments and improvement in human capital in farming.

Indian agriculture continues to be dominated by low- tech farm practices, low level of mechanisation and relatively lower yielding cultivars compared to global level. Upgrading farming from low tech to high-tech (green house cultivation, poly houses, tissue culture, precision farming) will reduce average cost, raise farmers income and address some scale disabilities.

Supply to Demand Driven Production

Imbalances between demand and domestic production have been growing for couple of years. India is accumulating large surplus of rice and sugar which involves huge cost to state exchequer. The reason is raise in output price by the Centre and payment of bonus by states, for these two crops, ignoring demand and supply or market situation. Even with strong support for its export, the country is not able to dispose off sugar in international market. Output price and input subsidy incentives are attracting more area under these crops rather than favouring much needed diversification. Experience of many countries, of late China, shows that paying higher than open market prices to farmers through mechanism like procurement cannot be sustained. Fixing prices higher than open market price attract imports for exportable and surplus commodities. More focus on supply than on demand is justified as long as demand is ahead of supply. Once, demand falls short of supply the guiding principle for price intervention should be open market price or demand side factor.

Climate Change and Sustainability

Many people view agriculture growth as green growth because green house gases emitted from agricultural activities are generally not visible. The emission results from application of organic and inorganic inputs to the soil for crop production, decomposition of biomass and dead plant residues, crop production, plant respiration, livestock rearing, enteric fermentation in ruminants, manure handling, and burning of crop residues. Agriculture is responsible for about 17 per cent of GHG emission in India which is almost same as its share in GDP. Three-fourth of this is due to methane produced from rice cultivation and livestock and the remaining 26% comes from nitrous oxide emitted from fertiliser. The share of agriculture in total GHG emissions will increase if burning of crop residue, which is now spreading to all states, is taken into account.

Air, water and land are the three pillars of sustainability. Agriculture uses more than 80 per cent of total water use in the country. Still more than 50% area under cultivation is without irrigation. Because of common practice of flood irrigation, water use efficiency in the country is around 30-35%. India use 2-3 times the water used to produce 1 tonne of food in major agricultural countries. Without improving efficiency of water use in agriculture through modern method of irrigation (drip, sprinkler, sensors) the country cannot address stress on water use and meet future water requirement.

Half of the land in India is under agriculture uses (arable land). Therefore, the way we do agriculture determines quality of soil and land resources. Very less area is available for ecological functions. Meeting land requirement for non agricultural uses and addressing sustainable land use necessitate higher productivity.

Agriculture is both part of the problem and part of the solution to climate change and sustainability. We must seize every opportunity to shift away from inefficient farm practices, towards long-term sustainability, efficiency and resilience. Among all sectors, agriculture offers the best hope for green growth that is environmentally sustainable.

Policy Interventions, Regulations and Reforms

Increase in production though essential is not sufficient to bring substantial increase in farmers income. Farmers have to be helped to get higher prices and some of them need to be moved to non farm occupations. Power of prices in raising farmers income and production is generally underestimated. A 10 per cent increase in prices realised by farmers directly raise their income by 13 per cent beside large favourable effect on production. Agricultural growth during the last 50 years has moved up and down depending upon the increase or decrease in relative prices of agricultural commodities.

Prices at farm level can be raised in two ways. First, by ensuring MSP and second by creating competitive market. In many states farmers get 10-20 per cent lower price than MSP even for paddy and wheat where large part of marketed surplus is procured by government. Ensuring MSP in such cases will raise farmer income by 13-26 per cent. It is important to mention that green revolution happened in those states only where farmers got remunerative prices. Recently, it has been demonstrated in Central and Eastern India. Often demand is made to raise MSP but it is more important to ensure that farmers get whatever MSP is announced by the government. At the same time, it is important to emphasise that paying prices higher than open market price through the mechanism of procurement causes many distortions. There is a need to think of alternative mechanisms like "Deficiency Price Payment" which are less costly, more equitable, and non distortionary.

The second and more subtle mean of ensuring better prices to farmers, without causing pressure on consumer prices, is through reforms in the system of marketing. This system and its infrastructure are outdated and exploitative. Rather than evolving, agricultural markets have decayed and serving the interest of intermediaries rather than farmers and consumers. Most of the farmers unions seek more doles for the sector rather than competitive and modern markets and other reforms in agriculture sector which can make the sector vibrant, self reliant and economically quite attractive.

The centre came out with a proposal to adopt Model APMC Act in year 2003 which was prepared in consultation with the states. The objective was to dismantle excessive regulation and control over markets, facilitate direct sale purchase, create more options for sellers, dismantle market collusion by local traders, and attract competition and investments in agricultural markets. However, the adoption and implementation of Model APMC law by states remained patchy, diluted and insignificant. Some states did not change the Act. Those which changed the Act did not notify rules, and where notification was done it was restricted to tiny fraction of produce. Thus, agricultural markets remained deprived of new commerce, modern infrastructure and formal sector participation, and modern value chains. Consequently, traditional capital, large price spread, price crashes at harvest time and spikes in lean period, with little value addition, remained the order of the day. This is leading to loss of faith in market and rising demand for MSP for every agricultural commodity.

After review of the progress in Model APMC Act (2003) the Union Ministry of Agriculture has prepared and shared with states more progressive marketing Act which also covers livestock -the Model APLM Act (2017). States are being persuaded to adopt

this Act but response is slow. Two other two important regulations being pushed by the NITI Aayog for adoption by the States are:

- The Model Contract Farming Act (2018) prepared by Ministry of Agriculture
- Model Agricultural Land -Leasing Act , 2016, prepared by NITI Aayog.

An important reason for slow change in agriculture and dominance of traditional marketing channels is very low investments in pre and post-harvest agriculture by corporate sector (Table 2).

Table 2: Share of various sources in gross fixed capital formation in agriculture and total Economy, 2016-17.

Sector	Capital investment as % of GVA	Share in total Gross Capital Formation in Sector %		
		Private Corporate	Public Sector	Households
Agriculture	13.83	2.82	18.75	78.43
Non- Agri	36.18	46.76	25.77	27.48
Economy	32.17	43.37	25.23	31.41

Source: National Accounts Statistics 2018.

Changes in APMC Act and provisions for Contract farming are expected to attract much needed modern private sector investments into agricultural marketing as well as agricultural production. This will also reduce the need for government intervention and support for agriculture.

Recent available survey of NSSO reveals that land lease is on rise but it is oral and not recorded. 59% area in AP, 30% in Bihar, 20% in Odisha was under lease farming in year 2012-13. Country average is 11.6 per cent. Such farmers can't avail institutional credit, crop insurance and other govt benefits for agri. The incidence of tenancy is expected to rise further as members of farm families are moving out of agriculture. Recognition of land lease and protecting right of landowners, will help in raising farmers income in a number of ways and help in emergence of new class of farmers.

Substantial increase in farmers income and transformation of agriculture require a paradigm shift in entire approach towards agriculture sector. Advancement in science led technology, enhanced role of private sector in both pre and post harvest phases,

liberalized output market, active land lease market, and emphasis on efficiency will equip agriculture to address challenges of 21st Century and contribute towards goal of New India. A well co-ordinated action and strategy between the Centre and states is needed to ensure that agriculture marches to next stage of development along with other sectors, and agriculture is not left behind as it happened in the post 1991 reform agenda.

Views are personal.

Annex 1

Dietary Energy Supply (DES) and Share of Cereals and Meat in itselected countries

	Dietary energy supply(kcal/capita/day)			Cereals share in Total DES %			Meat share in Total DES %		
Country	1995/97	2004/06	2011/13	1995/97	2004/06	2011/13	1995/97	2004/06	2011/13
Brazil	2832	3087	3264	31	32	29	11.1	11.8	13.7
China	2711	2879	3096	57	50	46	11.8	14.6	16.4
India	2341	2283	2446	59	57	53	0.9	1.1	1.0
Indonesia	2530	2471	2752	67	63	63	2.9	3.0	3.5
Viet- Nam	2009	2474	2725	71	64	57	8.9	13.4	17.0
World	2673	2765	2876	48	45	44	7.7	8.3	8.9

Source: FAOSTAT

CESS Foundation Day Lectures

Foundation Day Lecture		No
The Emerging Development Scenario in India - Contest between Trend and Drift	- *VM Rao,* May 2013	1
Economic Growth and Social Development - Synergic or Contradictory?	- *Dr. C. Rangarajan,* May 2014	2
Further Reflections on Counting the Poor - With Particular Reference to Identifying the Urban Poor	- *Prof. S.R. Hashim,* October, 2016	3
The State and the Market in Asian Economic Development	- *Prof. Deepak* Nayyar July, 2017	4

Prof. Ramesh Chand is currently Member of NITI Aayog and the Fifteenth Finance Commission (in the rank and status of Union Minister of State). He has a Ph.D. in Agricultural Economics from Indian Agricultural Research Institute (IARI), New Delhi. He is Fellow, National Academy of Agricultural Sciences and Indian Society of Agricultural Economics. Prof Chand has over three decades of experience in research and teaching in the field of agricultural economics and policy. He has been involved in policy formulation for agriculture sector for the last two decades. Prior to joining NITI Aayog, he was Director, National Institute of Agricultural Economics and Policy Research, New Delhi.

In addition, Prof Ramesh Chand is also Member of

- Board of Trustees (BOT) of CIMMYT (International Maize and Wheat Improvement Center), Mexico.
- The Policy Advisory Council (PAC) of the Australian Centre for International Agricultural Research (ACIAR), Canberra, Australia.

In the past, Prof Ramesh Chand has worked in senior academic positions as ICAR National Professor; Professor and Head, Institute of Economic Growth, Delhi University; and Professor at Punjab Agricultural University, Ludhiana. Prof Chand has been Visiting Professor at University of Wollongong, NSW Australia and at Institute of Developing Economies, Chiba Shi, Japan. He has also been Consultant with international organizations such as FAO, UNDP, ESCAP, UNCTAD, Commonwealth and World Bank.

Prof Chand has chaired important committees on Food and Agricultural Policy set up by various Ministries of Government of India. He has served as India's nodal officer for agriculture for SAARC for 7 years and represented India in meetings of G20, UNESCAP.

Prof Chand has authored seven books and published more than 150 research papers in reputed national and international journals in the areas of agriculture - production, growth, development policy, farmers' issues, markets and trade.

Prof Ramesh Chand has been presented Jawaharlal Nehru Award (1984) and Rafi Ahmad Kidwai Award (2006) of Indian Council of Agricultural Research. He was President of the 2016 Annual Conference of the Indian Society of Agricultural Economics held at Mumbai, India. He was President of the Agricultural Economics Research Association (AERA) held at NDRI, Karnal, India. He is the President-elect of the Indian Economic Association, 2019.

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