

# **The Future of Indian Agriculture**

Yoginder.K.Alagh

IC GOA

August 2016

# Context

- **Need for A Perspective: abolition of planning; Niti Aayog**
- **Population: Income Growth and Distribution**
- **Demand and Diversification: Away from Grains**
- **The Rural Urban Continuum and Markets; Urbanization and Structural Change**
- **Profitability, Investment and Technology**
- **The Puzzle of High Investment and Trend(not low?) Growth; Factor Productivity and Declining Returns? Land and Water**
- **For 2020 a Benign and a Cruel Vision; Modeling is OK, but as my favorite Joan Baez sang in my youth ‘The answer my friend is blowing in the wind’**

# The Recent Past

- Indian Agriculture is stagnating. The Economic Survey and RBI, say that. Senior policy makers dont .
- In the period 2007/2011 agriculture grew at trend rates 3%+.
- But “2014-15, the CSO has estimated a positive growth rate of 1.1 per cent for agriculture”( GOI, 2015, p.18).
- For 2014/15 CSO says the growth rate of the Agriculture, Forestry and Fishing Sector according to the CSO is now estimated as minus 0.2%.
- The preliminary estimate for 2015/16 at 2011-12 Basic Prices, is 1.1% ( CSO, 2016,Statement 3, p.8, not comparable with earlier estimates ).
- Is the problem Incentives for Agriculture? Since 2008/09 and in the period until 2010/11 TOT’s moved in favor of agriculture, continuing the earlier trend.
- Since then, upto 2013/14, there has been a decline.
- Profitability of Indian agriculture has fallen by around four percent. It can be argued that 4% is less than an earlier Alagh estimate of 14% (2001/11) but that was over a decade and now it is a three year period.
- Assume all this away and posit a 4% plus growth. Not doubling but high growth. Also policies friendly to agriculture and TOTs reviving
- The Future needs visioning to Turn Around

# The Context

**Indian agriculture must meet the requirements of food security and rapidly diversify itself.**

**Function in a rural urban continuum, with rapid developments of markets and shifting of working populations from villages to linked small towns and also from crop production to value added activities.**

**Employment growth will be high in these activities chasing a high rate of economic growth.**

**Technology and organizational support and the necessary economic support in terms of pricing and infrastructure.**

**Otherwise Rising food prices chasing few goods and immiserisation.**

**A small model confirms (Y.K.Alagh, The Future of Indian Agriculture, NBT,2012).**

# Population

- The Niti Aayog does not have a separate population projection and the RGs Expert Group is still working. In an earlier plan exercise the numbers were given.
- **Population Projections in Eleventh Plan;**
- **2011/12 1208 million**
- **2016/17 1283 million**
- **Source**; GOI, 2008, Eleventh Plan, Vol.1, p.75
- The late Marie Bhat and Tim Dyson estimated **higher numbers**
- **We use UN medium projections, slightly revised now as follows;**

## **Population (billions)**

- **1.0 (2000)**
- **1.2(2015)**
- **1.4(2030)**
- Source: F.A.O., 2006 as quoted in F.A.O., 2008, p.24.
- **Census Towns:Uncertainty? Demographic Dividend (Y.K.Alagh, 2006b)**

# Census Towns

- The big movement in the last decade and half in India is from villages to Census Towns. These are habitations still not recognized by the establishment as towns but with all the characteristics of urban areas.
- ‘The Census of 2011 estimates that 833 million people continue to live in rural India.’(Government of India,2011).
- The Planning Commission finally changed its earlier figures on urban population in 2011 of 357.95 million to the Census 2011 figure of 377.11 million(missing out 2 crore persons) and in the Approach Paper to the 12<sup>th</sup> Plan noted the phenomenon of Census Towns.
- But its projections for the future were sadly as earlier.
- They underestimated the rural population moving to small (Census, not official) towns by 37 million people. That is a lot of people and for policy a critical slip up. As compared to an existing population of 377 million, the projection of 405 million in 2017(Government of India, 2006) was grossly low. We have to get back to the drawing board, but new projections are not there.
- Millions have moved to small towns following agricultural demand but they are not seen as urban and so the infrastructures to process, store and sell is not there.
- Smart Cities ignores all this.

# Economic Growth

- **India will grow between 6 to 8% annual and will become the third or fifth largest economy of the World in the period 2000/2030.( V.Pandit, 2004 and Y.K.Alagh, 2000,2006a)**
- **Investment rate and productivity growth will be the drivers. A third of India's GDP growth in 97/03 is technology driven. The 12<sup>th</sup> plan wanted it in the future but now planning is abolished.**
- **Trade will also matter-will become around 4% of World Trade.**

# Demand Diversification

## Demand Systems for Rich and Poor

- **Decadal Growth of cereal demand is 13% . Growth of demand of fruits and vegetables, eggs, chicken and milk is much higher.**
- **Low growth of cereal demand is compensated by very high demand growth of non cereal based and non crop based agricultural goods.**
- **The projections are no longer very sensitive to redistribution assumptions. What will the poor do, she said if apple prices rise?**

# Market Access

- **“..In terms of market access only five percent of South Asians live in “remote areas” whereas more than 30 percent of Africans are in this situation. Similar characteristics hold true for the percent of the population living in higher potential agricultural areas,..” (FAO, 2008,p.4)**
- **Census Towns in 2011.Markets without Infrastructure**

# The Krugman Model

Nobel Prize P. Krugman, explains urbanization as the outcome of both centrifugal and centripetal forces. Urban growth rate in the 1980s went down from 3.8 per cent to 3.12 per cent, that of Class I towns went up from 6.39 per cent to 8.39 per cent in India.

Fast growth of Class I towns since the 1980s--the period when the Indian economy grew at a rapid rate-- will continue.

Elasticity of urban settlements with a minimum size (1,00,000 +) w.r.t. per capita income(b) will continue. Growth of such towns in the future continues, but the population share of smaller towns will shrink. This feature has been modelled (Alagh, et al., UNU, 2000).

# The Forecasts

- **Urban Population will now be forecast from:**
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- **$U_{pt} = A(Y_t)^b / K + U_{10}$**
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- **Assume a growth of 6.6% annual in per capita income  $Y_t$  then the rate of growth of Class 1 cities will be 4% for the period 1991 to 2020, since  $b$  is 0.6. The share of urban population will be 42% in 2020 as compared to the official figure of 32% ( See GOI, Technical Group, 2006; Now there are no projections. A Group is working on this under the Census RG, but there is no time pressure on them.).**
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## Population and Work Force

- **Rural population share will go down to 58% in 2020 and 55% in 2025. But the official projection is 68% in 2020 and 64% in 2025(GOI, 2006, Table 10, p.56).Urbanization will be higher.United Nations has also recently reproduced the Alagh version of the Krugman model of urbanization as estimated for India (See United Nations., 2008).**
- **Rural Population in 2020 will be 738 million out of the total population of 1273 million projected above. The earlier Plans had projected the rural labor force as 45.7% by 2016/17, the last year for which they have given projections (GOI, 2008, Vol.1, p.75, Table 14A). An earlier projection by G.S.Bhalla and P.Hazell (Bhalla and Hazell,2003, p.3478) using age specific participation rates separately for rural areas was 46.9%. We assume a participation rate of 46% and get a figure of 340 million as the labor force. This is much lower than the figure of 404 million estimated by Bhalla and Hazell on account of a much lower estimate of urbanization.**
- **Prepare for urbanisation linked with Villages**

# ICOR Rising

- In the low capital formation phase that a gross rate of capital formation of about 12% of Agricultural GDP was considered necessary to support an agricultural growth rate of around 3.5% to 4% annual. For example:
- “It would be naïve to plan agricultural growth and policies with low incremental capital-output ratios (ICORs). In terms of gross capital formation, past ICORs are estimated as follows:
- | Period             | ICOR |
|--------------------|------|
| 1978/79 to 1986/87 | 4.37 |
| 1987/88 to 1991/92 | 3.32 |
- Agricultural gross fixed investment is around two thirds of agricultural gross investment. It would be imprudent plan for an ICOR of less than 3 for agricultural fixed capital formation.” (Y.K. Alagh, 1997, p.283).
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# Productivity and Non Renewables

- These kind of investment levels have been consistently exceeded, but the agricultural growth rate does not show the resilience that a twenty percent capital formation would provide. This in turn raises in a fundamental way questions of productivity of investment and non renewable resource constraints of land and water. Real resource scarcities remain. Cropped area, earlier a constant, is falling while the area under irrigation is a matter of concern.
- Since widespread growth is required, a policy of “walking on two legs” is needed with improved productivity of cereal producing areas allowing land to be released for high value crops. My perennial regret is Punjab for long denying the benefits of Hybrid Paddy. In the short run, technology and input intensification are seen as the source of growth as policies of land and water management take effect.

# Rural Urban Continuums

- **Faster diversification of the sector is required to achieve growth objectives, and this requires policies relating to market reform and social infrastructure in the context of the rural urban continuum.**
- **Institutional reform of markets, empowerment of small farmers to leverage their assets for strategic partnerships with corporates, new technology and market linkages, including first stage processing and the establishment of farmer groups and local institutions to build up the support bases for emerging Indian agriculture is advocated. Producer Groups, incorporated under the Companies Act and alternative methods of organisation are prospering but in limited areas. But they are not liked by some Corporates, while others make money from them.**

# Financing Diversification

- **NABARD and agro climatic planning in its lending(1990) but that was allowed to get into disuse. This concept is reintroduced in the Boston Groups restructuring plan for NABARD.**
- **Nabard's new thinking is state of the art in the rural development game.**
- **Refinancing for financial products to suit each regions agricultural priorities leaving the State funding to the Plan.**
- **Very few private and no foreign banks, apart from the Dutch coop Rabo, give rural credit.**
- **Some State examples. Maharashtra has an easy scheme to finance watershed development, ridge furrows, seeds for tree crops, even expensive ones as in Bt, drips and for the tree growing cycle for horticulture.**
- **New needs. Fodder crops, money for innovative water management, combinations of farm ponds and drips, piped delivery systems, certifying organics and meeting the preliminary costs of leaching the soils of accumulated muck and so on. The usual examples are to the contrary say in many States Producer Groups incorporated in the Companies Act do not get working capital since the rules are there only for coops.**

# **Newer Synergies**

- **Newer strategies need newer financial instruments. Institutional reform of markets, empowerment of small farmers to leverage their assets for strategic partnerships with Corporates, new technology and market linkages and the establishment of farmer groups and local institutions.**

# Newer Institutions

- **Producer Companies: Earlier Hesitation; NABARD's Initiatives: Collateral in Theory; In fact. One Share?**
- **Newer Private Sector Approaches; I Shakti Pulses; Star Agri and collateral for Storages | |**
- **The Rest of the World: Temasek and Star Agri Today: 100% FDI? Opportunities (YES). Problems, Need for rule setting to protect Banking Decision Makers**

# Exciting Days Ahead

- **The RBI must change the rules so that the Institutions can go where no man has gone before and protect them when things go wrong, as in some cases they must.**
- **Also from the attacks of those to whom they will say No.**

# Technology

- **Groups pushing technology should be in the drivers seats.**
- **Should be with performance markers. Since the land base has stopped growing, productivity growth will have to be much higher. At the request of the present author, a Indian Statistical Institute team (Rabin Mukherji, et.al.,2001) worked out that the past growth of factor productivity in agriculture was 1.62 % annual in the decade 1981-90 and 1.55 % annual in the decade 1991-2000. This growth will have to be 1.72 to 2.08% annual in the period 2001-2020 if agriculture grows at roughly 3.5 to 4% annual and 1.9 to 2.5% annual if agriculture grows at 3.8 to 4.8% annual in the period 01-20.**
- **Thus to source higher growth factor productivity will have to rise at least by a third, which is difficult in agriculture. The discussion of agro climatic planning and policies highlights the importance of holistic approaches given the resource endowments of a region. These would include agricultural diversification, including animal husbandry and the neglected sector of tree crops and forestry.**
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# Technology Institutions and Policy Rules

- **The technology interface is important, both for land and water management and for cropping and non-crop farm systems that are optimal, in this class of issues. While a lot of research has been done and is available, (Alagh, FAO/ UNESCO, 2002) the real issues are policy rules for fast replicability of existing knowledge and success stories. Community institutions have to be at the heart of this process. Successful projects examined have varied considerably. Watershed development, for settled agriculture alternately tree crops, reclamation of saline lands, farmers run lower level irrigation systems, aquifer management in difficult situations, like coastal aquifers, tribal irrigation cooperatives, tank irrigation have all been reported as success stories and studied. The question is replicability on a larger scale. We have (YK Alagh,2003) tried to set out some policy rules which we argued if applied in functioning policies may reverse the tide .**

# Alternative Futures

- **The absolute level of employment will fall and is falling in agriculture. The Planning Commission had estimated that agricultural employment will fall by 3.97 million persons in the period 2006/07- 2016/2017 (GOI, Planning Commission,2008,Vol.1,p.76). The data is not in but indications are that it is happening. This is happening simultaneously with a rise in agricultural wages.**
- **Will this process be benign with rising wages or will be a cruel process of the kind witnessed in the early phases of industrialization in UK for example. Rising wages have been the trigger for beneficial technical change in processes like harvesting, clearing the land in time for multiple crops and agro processing activities. There is anecdotal evidence that this is happening in India after the introduction of NREGA. NREGA of course would also set a floor to the wage level in the transformation of the rural economy.**
- **Indian agriculture can meet the requirements of food security and rapidly diversify itself. It can function in a rural urban continuum, with rapid developments of markets and shifting of working populations from villages to linked small towns and also from crop production to value added activities. Employment growth will be high in these activities chasing a high rate of economic growth. All this will happen if the institutional structure gives the appropriate signals in term of technology and organizational support and the necessary economic support in terms of pricing and infrastructure support. Otherwise there will be rising food prices chasing few goods and immiserisation.**
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# Some Numbers from a Model

- Two alternative processes can be visualized. One a Normative scenario where the process of rural transformation India is going through is benign. The other Business As Usual, which is present trends going into the future. To sharpen these choices, these two scenarios are presented in a larger framework :
- Employment Scenarios: 2020
- -Normative and BAU-
- India 2020
- Total Population (million)  
1273
- Rural Population (million)  
738
- Labour participation rate %  
46
- Labour Force (million)  
340
- GDP growth (% annual)  
8.5
- GDP agricultural growth (% annual)  
4%

# Policy Parameters

- Employment elasticity w.r.t..
- Agricultural growth (Low) -0.3%
- Employment elasticity w.r.t.
- Agricultural growth (High)  
-0.1%
- Land augmentation through
- Increase in cropping intensity (High)  
0.5%
- Increase in cropping intensity  
0.0 to 0.2%
- Source: Text Discussion
- In the Normative benign framework of development, agriculture will grow at 4% annual, technological change and diversification will be high so the shift away from agricultural on this account will be 20% over the decade 2010-2020. (Elasticity of employment -0.3%). This will mean a corresponding increase in real wages of the agricultural labour force.
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# The Bads

- A non inflationary rising wages for the poorest and most backward regions is not automatic
- If the shift does not take place on account of poor agricultural productivity increase, with an employment elasticity of minus 0.1, and a growth rate of three per cent annual, the shift will be 4% and an insignificant increase in real wages of the agricultural sector. The need for programme like NREGA will be intense with the present trends of casualisation of the labour force increasing. This will be a very cruel process of economic transformation.
- The Rural Urban Continuum can be hell. Small towns and large villages without infrastructure breaking at the seams with trading pressures are not very pleasant places. BOD a polite word for human waste not disposed comes out of the tap
- But the Smart Cities are not around the rural urban continuum. The comfort needed for such efforts in small towns is not there. The Small town plan scheme was abolished by the Planning Commission and JNURM was supposed to take care of them(now smart cities). But largely concentrates on large cities with low hanging fruit.

# **Another Happy Possibility**

- **The only other factor which will affect outcomes in this logical framework is the augmentation of the land base of Indian agriculture. This aspect is discussed in the context of the Land and Water. If land augmentation emerges again with success of the interrelated issues of land and water management, cropping intensity can rise by 0.5% annual and in the decade 2010 /2020, real wages would rise by 7% additional or 27% in the total and rural-urban inequality would go down.**
- **A bonus worth aiming at, close to my heart, but the subject for another lecture. I must keep future invitations open**

# Conclusion

- **The prospects for Indian agriculture are good. Demand will grow fast and if we create the correct incentive and organization systems the Indian farmer will not fail us as he has responded well in the past when our policies were supportive.**
- **Research and support systems will have to concentrate on a much larger cafeteria of crops and support to non crop agriculture, including animal husbandry, fish and forests.**
- **This will need newer organizational systems and financing and price and tariff support systems, as for example needed in pulses.**
- **The real dangers apart from anti agricultural policies are in running into real resource constraints. Again here the strategies for land and water management are known and agricultural research can fill in the gaps. As member of the Planning Commission it was my good fortune to develop his vision of a detailed agro climatic strategy for India. The prospects are better and it is more urgent now. It is encouraging that after a false start the Niti Aayog is developing a Long Term Agricultural Plan as in China after abolishing planning, which is good. But unlike the Chinese successor body they are not empowered to fund the Long Term Agricultural Plan, which is bad, because Ministries ignore studies without a bottom line for them?**
- **Thank You and Jai Hind**