Technology Policies and Investment Strategies

Yoginder K. Alagh

Introduction

This paper addresses selected issues on technology, investment and policy strategies for widespread growth of a kind which builds–in poverty reduction, in the sense of significantly reducing food, energy and related income/employment gaps, in low income countries in the Asia–Pacific region. The methodology it follows is bifocal. It takes three case studies of success, the first being agricultural growth in fragile agro–ecological regions, the second artisan–based industrialisation linked with regional and global markets and the third a recent experiment in wiring villages with information technology to source knowledge in the growth process. The technology, income, food, and energy outcomes are described. At the second level, however, our interest lies in how these case studies reveal organisational structures, human and related resource–development strategies, market frameworks, incentive and disincentive mechanisms and macro requirements for widespread replication[1].

The paper takes the approach that that micro and macro policies have to be harmonised for widespread growth of the poverty–reducing kind to take place. This is discussed extensively, but not practised enough. The power of decentralised markets to facilitate such growth on a larger scale has to be enmeshed in strategic policy initiatives to energise it and to resolve the inevitable problems that arise. These broader perspectives are discussed, for example, in Robert Wade's well–cited paper (1992) on East Asia's economic success, which interestingly begins and ends with a quote on strategic intervention from a paper in the ADB's *Asian Development Review* (Alagh, 1989). In a later contribution Stopford (1994) repeated the same quote in order to emphasise that instead of sectoral intervention (picking out winners?) the need now is for a dynamic perspective on labour skills, innovation and developing the market places of the future. The importance of macro policies consistent with poverty–removal strategy is underscored by the contributions of the President of the OECD Development Centre and the Vice President of the ADB to this volume. For broad–based growth of the kind discussed in this paper, we would add policies for the development of markets, financing, information and communication infrastructure. The paper by Bussolo and O'Connor in this volume also underlines that institutional issues are central in integrating technology with poverty–removal strategies.

Sustainable Livelihood for the Marginalised

Consistent agricultural growth over a period leads to declines in rural poverty in the areas where such growth takes place. The so–called Green Revolution areas are a case in point. Agricultural growth of over 3.5 per cent annually for two decades or so invariably led to critical elimination of hunger and significant declines in poverty levels. Yet such growth took place in areas with good soils and assured rainfall or irrigation. FAO studies showed that the elasticities of cropping intensively and of land productivity with respect to irrigation were around 0.3 and above 0.5, respectively, so assured water supply was land–augmenting (see FAO, 1993). Hayami (1981) showed that this kind of growth raised the demand for labour, employment went up and poverty levels declined. The model of atomistic peasant agriculture worked here. The benefits of state–supported agricultural research could reach the farmer if land rights were established. Input and output disposal markets worked because irrigation technology and market support were very much a part of this strategy. Yet it worked only in selected areas.

Policy in India, for example, worked around it (see Alagh, 1988, 1989 and 1991*b*, and Planning Commission, 1989). In the early 1980s some critics called this the favoured–crop, favoured–region model. Another critic described the planning of this strategy as limited and linear thinking. The problem arose in areas where the initial favourable conditions did not exist. These areas were bypassed in the growth process. In India, in the first phase of the Green Revolution, growth was negative in a fifth of the districts, and in another two–fifths it could not keep up with population growth. In Sahelian Africa, many countries in the rest of Africa and some countries in Latin America, the situation was worse and continued so. The prime issue for institutional development and policy is to reverse this process. With all the advances made in understanding the organisation of agriculture, technology and resource management, the persistence of mass poverty and hunger presents a striking contrast with claims of universal progress.

An interesting aspect of these problems is their relationship with environmental problems. These are "fragile eco–regions". They are the arid and semi–arid regions described in the FAO–UNESCO *Agro–Economic Zoning Atlas* (FAO, 1978/81, 1982). They are the hill slopes with declining tree cover and rainfall causing soil erosion. They are the coastal areas with disappearing mangroves. They are the saline lands and the problematic soils. As in the plateaux and arid regions in India, communities had through time established a balance in these areas between carrying capacity and human need. There was poverty, but there were also time–honoured practices of sustaining the fragile resource base with activities, technologies and customs evolved through centuries of experimentation and adaptation. In the last century, dramatic reductions in mortality and resource demands from outside have rudely shaken the carrying–capacity balance of such areas.

Very little organised work is available on successful models under these conditions. In the late 1980s, an attempt was made in India to build up a set of best–practice cases that had worked. I summarised them in work done for starting an agro–climatic policy exercise in India and in a book written for WIDER (Alagh, 1991*a*). The cases had some common characteristics. The economic rates of return to investment were high — over 18 per cent on the investment made. Substantial food and energy deficits of the rural communities studied were met (Table 1). The technology consisted of land and water development followed by the introduction of appropriate "cropping" sequences. On the hill slopes it involved watershed development, contour building, gully plugging and work along the ridge contours. In coastal areas, it was aquifer management; in saline waterlogged soils, soil amendments and drainage. Vegetation cover was a part of the strategy. Appropriate tree cover for consolidating soil and either tree crops or the "recommended" crops followed the land and water development strategy. Generally a two–crop sequence or tree cover, either of which helped further to consolidate the soil, substituted for a low–yielding cereal.

From the replicability angle there were some interesting features. Leadership at the community level was important in all these cases. Generally the leadership group had some science background. The leaders were from NGOs or social–work organisations, retired army personnel, civil servants and in one case a farmer. The technology for land and water development was generally available in the institutions of the region, although some local adaptations were made, in the saline waterlogged soil–reclamation project, for example. In each case the major work was at the community level. Individual landholders had to co–operate for well–defined purposes. In fragile agro–ecological regimes, limited co–operation is a precondition for land and water development strategies to succeed. If one farmer stays out, the contour bounds of the others will be washed out in the next monsoon. The atomistic model alone cannot work here. The success stories inevitably involved a period of basic education and group consciousness.

The economics of these efforts led to interesting questions. While these projects had high internal rates of return on the investments made, they ran financial losses. Generally markets were weak in fragile regions, output prices were lower than border prices and input prices higher. In the initial phases land productivity levels also are lower and improve as the effort proceeds and the organic composition of the soil improves. Sometimes low–value productivity crops are needed to improve soil composition. While generating employment or improving access to food and energy, such activities need initial subsidies. Ignacy Sachs (1991) suggested that these be funded as "front–up costs" in his summary paper for the Hague Conference[2].) In his paper Sachs asked for "…a welcome shift from crop oriented policies to production systems oriented ones, with special emphasis for the needs of small farmers." He pointed out that "Alagh [1991*a*] gives many examples of watershed development projects with a short payback period. The techniques for such projects are well known and their impact at the level of the community would be very favourable. Yet they need public funding for the "front–up" costs. Alagh argues in favour of an agro–climatic planning in terms of alternative agricultural and farming systems, in order to overcome the shortcomings of a favoured crop–region approach."

Table 1. **Selected Characteristics of Watershed Development Projects in India**

Name	Land/Water Development Cost Rs/hectare	Current Input Rs./hectare	Annual Return (Amounts are in Rs/hectare)	Remarks
Naigaon	11 364	2 809.56	912	
Sukhomajri	22 221		7 979	Benefits include those to village and government, agriculture, dairying, fisheries and fodder. IRR was 19 per cent.
Samithed	1 500	n.a.	n.a.	Returns are in terms of plantations, rise in water table and fodder on 312 acres of land; 78 000 saplings.
Ralegaon Sidhi	9 689	n.a.	n.a.	Drinking water available within 100–150 metres of each household.
Tejpura	4 246	816.8[a]	3 764	Doubling of *bajra* and *jowar* yields: 70 crossbred cattle are given green fodder.
Mittemari	2 030	n.a.	n.a.	Incremental income of Rs. 2 540 per household as compared to control village.
Sikandurpur and Kotpurva	11 220	10 825	255 days of grain requirement for a family plus 400 days of fodder for pair of animals	Saline Land Reclamation Project
Sikandurpur and Kotpurva	11 220	10 825	255 days of grain requirement for a family plus 400 days of fodder for pair of animals	Ussar Reclamation Project

a. Additional.

Source: Alagh (1991*a*).

This was integrated in Agenda 21 and the Rio Conference. The effort by community–level agencies is now such that in countries like India the approach is no longer at a pilot level but is the beginning of a movement. The literature on case studies I initiated has been flatteringly duplicated, and the table I presented of eight cases (Table 1) has been replicated for over fifty efforts (Chopra and Kadekodi, 1993). More important, the largest NGO supported by the EC in the land and water field (Sadguru in Panchmahals) and another group supported by a German programme (WOTER in Ahmednagar) put 124 316 acres under tree cover, as verified by independent evaluations. This is just a little less than the tree cover lost in India in the years 1990–95. (For a World Bank assessment, see Lele *et al.*, 2000.) The EC–supported group, the advisory committee of which I chair, has recently completed a training programme for Sahelian tribal leaders supported by NORAD and the Agha Khan Foundation.

The requirements, however, are not in hundreds of thousands but millions of hectares. Government support for such programmes in India has just about kept constant. International support has gone down. This was a period of "economic reform". Why do we find it difficult to help those who help themselves even in the core areas of local and global concern? As preparations for the Kyoto meetings showed, we are well behind the Rio targets in the interrelated areas of land, water and energy.

While the institutional issue has been the focus here, the technology questions are also present, particularly in the recent phase of biotechnology possibilities. As discussed earlier, in fragile agro–ecological regions, tree crops can be important in diversification away from low–productivity cereals. An interesting experiment in India has been the creation of a very large tissue culture facility for tree crops. Claimed to be the largest in the world, this facility has been created in the private sector by the Tata Energy Research Institute (TERI), with a grant from the Indian Department of Biotechnology of the Ministry of Science and Technology. TERI is grappling with a delivery mechanism for farmers in different agro–climatic regimes. A possibility under experiment is the creation of biotechnology parks for small entrepreneurs, who will be the vendors.

Technology for widespread agricultural growth is leading to interesting organisational innovations. Another "mission"–oriented project in this context has been the Hybrid paddy project, conceived as a goal for Indian agricultural scientists when the Indian seed market was liberalised in the late 1980s. The project was planned as a consortium of public and corporate entities as follows:

A. Private, including MNCs

1. Hybrid Rice International Co.
2. Mahyco Seed Co.
3. SPIC PHI Biogene Co.
4. Hindustan Lever Ltd.
5. Vikki's Agrotech Ltd.

B. Public

1. DRR/KVK Gadipally
2. Department of Agriculture, Tamil Nadu and EID Parry Co.
3. Karnataka State Seed Development Corporation
4. A.P. State Seed Development Corporation
5. Department of Agriculture, West Bengal and Pallashree Seed Co.

Local, National and Global Rules

The problem of imposing a hard budget constraint at the local level and helping those who help themselves is a difficult one to address. Another way of setting the problem is as one of harnessing the great vitality of decentralised markets in replicating widespread rural growth within the core areas of local and global concern. Some of the lessons that result are as follows.

— Financial institutions must design structures such that community collateral is possible for viable projects. Self–help financing groups are only one such structure. Land and water development groups, local infrastructure projects in the road or communication sectors (Alagh, 1999*a*), bringing products developed in R&D institutions into production, training for production with improved techniques and market development schemes developed by local and community groups would be other examples (ADB, 2000).

— Lending through a weather or project cycle would be necessary. The Indian National Agricultural Bank started a scheme of this kind in 1991 as part of an agro–economic regionalisation strategy started by the author, gave it up in 1993 and is starting it again now (see Reserve Bank of India, 2000, for details).

— It is reasonably certain that problems are going to arise in development experiments that are off the beaten track. The question then arises whether there is somebody in the policy decision–making structure who will sort out the problem. A solution is to develop policy "champions" for sorting out administrative, financial and procedural issues at local, regional and national levels, when such problems arise with these kinds of development strategies. ADB (2000) reports in a detailed study of farmer–managed irrigation systems that the failure cases were those where such support did not exist. Failure here is defined as performance levels in water delivery lower than those of government agencies. These kinds of problems arise partly because the existing legal and administrative systems and financial rules are structured for formal organisations in the public or private corporate sector. So are global financial institutions. The newer kinds of institutions with strategic mixtures of organisational styles — co–ops and corporates, NGOs and government, NGOs and co–ops — do not have a level playing field (see Alagh, 2000*a*, for an attempt to develop a new legislative framework for co–operatives to incorporate as corporate entities). For example, a loss–making, subsidised electricity system can underprice a renewables group and drive it out of the market. The long–term problem is reform in the sense that subsidies and protection given to established groups have to be withdrawn. In the short run the protection given to each group must be the same.

— The structure of incentive and disincentive systems for this kind of growth should begin with a taxonomy of complementarities of policy rules at different levels of policy making — like no level can spend more resources than it has access to. Yet resources, which are short or binding constraints at national or global levels, are elastic at local levels, although their mobilisation requires policy changes at higher levels. For example, it is easy to buy a tax–free New York City bond, but very little attention has been paid to markets for local bodies' bond paper in developing countries and the fiscal reform that has to precede them (see Vaidya, 1999, for a description of an exceptional effort in Ahmedabad and the difficulties faced.)

The last three problems essentially signify that the reform process has to be fairly deep–rooted for widespread land– and water–based poverty–reducing growth processes to take place. The kind of growth discussed meshes well with higher output, income, employment and trade. Improved management of water leads to crop diversification. In the typical sequence, a poor–yielding, mono–inferior cereal is succeeded by a high–yield cereal and a commercial crop or tree crops. In the Indian case, exchange–rate reform led to higher growth of agricultural exports before the East Asian crisis cut down demand in the fastest–expanding markets (Alagh, 1995). Recent evidence shows that the districts that are sources of non–traditional exports have gone through a phase of land and water development sequences (Alagh, 1999*b*).

Artisan–Based Development

Serious research during the last decade and a half has shown fairly conclusively that the tremendous opportunities available with the new technology require groups and systems able to manage its interdisciplinary nature, because applications cut across areas like biotechnology, communications and computerisation. If the preconditions are available the technology spreads very fast, through both space and sectors of the economy and society. If the physical and human infrastructure is not there, however, vast areas will be left out, including some in the developed world. There is also the need for quick response. As Ricardo Petrella of the EC's FAST Group pointed out, each generation of innovations builds on the corpses of earlier ones (Petrella and Granrut, 1992). State and parastatal agencies find it difficult to perform in this framework.

Major think tanks working on the character of the Neo–Fordist technological revolution, like the FAST Group of the EC, the flexible industrial specialisation networks and others have emphasised the strong compatibilities with networking and decentralisation. As the Science and Technology Minister of India, I convened for UNESCO a Prepcom meeting at Bangalore for the World Science Conference at Budapest. The Bangalore Declaration strongly reiterated that the spread of technology was an institutional and not just a technology issue. Small, flexible groups responding to needs are effective. The need for partnerships of community initiatives to back those who work is again obvious.

The Industrial Districts literature in the OECD countries gives many examples of this kind of growth. The original Piore–Sable case of fashion garments in Emiglia Romana was flatteringly replicated for leather goods in Lyons, furniture in Denmark and sports goods and gold jewellery in Valencia. The literature on standardisation and lean production also falls in this category (Sengenberger and Pyke, 1992; Pyke, 1992).

These kinds of developments were not supposed to have much relevance in poor countries, but recent work shows that artisan–based responses to national and global markets can be powerful sources of growth. In any case, they are not insignificant in exports from poor countries. As much as a third of India's engineering exports are attributed to them. A recent case study of a small town of Trichengodu in a dry and backward region of India showed how satellite dish antennas and garments for global markets and truck bodies for the domestic regional market became a powerful source of growth, almost doubling industrial employment and generating a $250 million increase in output. A large part of India's diamond cutting comes from the town of Surat, which had less than half a million in population when the expansion started now has around three million (Table 2). India is the largest exporter of diamonds in the world.

Table 2. **Demographic Characteristics of Surat City**

Year	Population (million)	Workers (million)	Growth (annual, in per cent)	
			Population	Workers
1971	0.47	0.15		
1981	0.91	0.32	6.84	7.80
1991	1.52	0.52	5.20	5.10
2001	2.81		6.61	

Source: Misra and Misra (1998).

The success studies here involve training and improvement of inherited, community–based artisan skills. The organisational pattern is generally based on fierce competition between small firms, with considerable mobility between self–employment and wage labour. The communities (castes in India) also engaged in training and skill enhancement, access to larger markets through traditional networks and technology enhancement, for both production and markets/communication. A Surat diamond–cutters study (Kashyap and Tiwari, 1985) found the following:

— An organisational structure of distribution, processing and markets based strongly on trust, with the roughs (*passas*, as they are called) and polished diamonds changing hands without any written documentation;

— Constant upgrading of technology on the production side, with hand polishing giving way to semi–automatic tools;

— Intense competition and mobility in the lowest polishing formations;

— Community (caste) based training efforts of a decentralised nature in each *Taluka* (sub–district town) centre in Gujarat.

Similar characteristics have been recorded in the Thrichengodu case (Box 1) (Houllier *et al.*, 1994) and the gold thread industry (Desai, 1995).

Box 1. **Tiruchengodu: A Profile**

Turuchengodu is located in the Salem District of Tamil Nadu in South India. It is a dry, rain–shadow, backward region. Population growth from 1971 to 1991 was 71 per cent, as against an average of 37 per cent for its size–class of towns. Its low sex ratio shows a highly male–selective immigration pattern. The number of electricity connections per thousand of population for industrial and commercial purposes was much higher than for the district capital of Salem. It has strong inherited artisan skills, caste–level training and education centres. The major industries are textile garments, truck bodies (for which it is now India's second–largest centre), satellite dish antennas and truck/rig operation (5 000 truck/rig units work in dry regions of central, western and south India). Garments and satellite dish antennas are produced mainly for export.

Source: Houllier *et al.* (1994).

Kashyap and Tiwari (1992, 1998) found that a strong centralised promotion policy with product identification, financing, protection and technology support does not work. The proper strategy is to help those who help themselves, with support of local efforts to access market information, working finance, standards setting, skill enhancement and family welfare and worker health measures. The employment and poverty–reduction results of such strategies are dramatic. In Gujarat's case, poverty levels went down from around 38 per cent in 1972 to 18 per cent in 1997. High immigration into Surat has been noted (Box 1). Much the same kinds of approaches are necessary in diverse fields like education, health, urban problems and the larger debate on industrial restructuring policies. (See Lance Taylor's description of these structures in his *Rocky Road to Reform*)

Information Technology

While the leading role of information technology in India's trade and local growth has been documented, the same role in rural growth has not. We can discuss preliminary impressions of two such cases in a dry region of India. They refer to two co–operatives, one at Warna and the other at Pravara, both in the rain–shadow region of Maharashtra in Western India.

The Pravara Sugar Co–operative is the first one in India. It diversified from efficient production of cane and white sugar into bagasse–based electricity, high value–added chemicals and alcohol. In the 1980s, with a shortage of water, it encouraged diversification into dairying, horticulture and ice cream. It went into perhaps the first case of drip technology in line crops. By the early 1990s it was spending around Rs. 500 million annually on education and health, with a wide range of institutions, and in 1993 a group of eminent co–operators and educationists brought out a Rural Education

Policy Draft, which operationalised a strategy for using knowledge as a source of growth in rural areas. It envisaged a borrowing strategy for the best skills available for training at a global level and ultimately generation of local world class knowledge.

By 2001, the internet was completely integrated in the regional educational and infrastructure bodies like the co–operative bank. There was also a strong local training and service industry in this rural area, with a major contribution from women entrepreneurs. This part of the sector is financed either privately or with cross subsidies from basically profit–making entities. Farmers from the 55 villages of the co–operative have access to the internet in the local language in the production/service sectors. In this century Pravara begins the more difficult process — internet–based human–resource development at the village level itself. The technology package developed needs heavy investment in each village. The model insists on a one–third contribution by user charges or village contributions. The process is still working itself out.

The main characteristics of this project have been made operational in a project document (Roy and Alagh, 2001). This document notes that technology has "made presentation of data in the local language possible and updating of information has become simpler. Moreover, with minimum training, local youth can learn to operate the computers and help the end users.…[I]n village meetings, the farmers have informed that they do watch TV programmes aimed at agriculture, but lamented over their inability to communicate with the experts at the other end for clarifications of doubts…It is hoped that the target population will use it extensively to acquire necessary information, improve their all round efficiency and productivity and ultimately improve their quality of life." The project documents the target population in numbers, through space and by level and nature of activity. The objectives are:

- Set up village kiosks/centres;
- Generate awareness about information technology;
- Train village youth to handle village kiosk centres;
- Develop appropriate information material based on local needs — education, agriculture, markets, employment, health, weather, etc.;
- Establish a multi–point video conference facility on the intranet; and
- Promote e–commerce in the area.

A pre–feasibility technical study has been conducted, and first–phase hardware and systems are in position. Since questions of rural infrastructure availability are important and such experiments are few, the project deserves a brief description. Nandini Roy at the Shirdi Sai Rural Institute (SSRI), of which the author is the President, designed it. After some preparatory work, SSRI had discussions with public and private providers of IT services, including the Indian Space Research Organisation and the National Informatics Centre (NIC). NIC hardware and systems were used to provide connectivity initially to 11 rural institutions in the region. For the village–level system, intense discussion showed that a telephone–modem network was not possible. The existing 64 kbps VSAT at SSRI was upgraded to 256 kbps for village connectivity, both for video conferencing and browsing. NIC gave blanket permission for bandwidth and radio frequency use. The village level connectivity involves high–bandwidth point–to–multipoint connectivity by wireless wide–area network (RF technology). The 60 villages have been divided into three clusters. Each village will be connected to its hub centre through an omni–directional antenna. The project will cover around 65 kms. The connectivity is seamless. There is a separate software, system materials and content development program. SSRI has started the project with resources it has raised and is raising funds for the rest. It proposes an independent evaluation unit for renewal through real time. A phased budget is available.

In a period in which the region and the co–operative sugar sector were not doing too well, the Pravara co–operative has maintained a strong economic performance. It has always fought for reform. Abolition of controls, co–operatives free from bureaucratic control and now corporatisation of producer associations have all been advocated and lobbied for.

The WARNA case is similar, but its information technology experiment is different. It began in 1998, with a strong impetus from Delhi, after the setting up of a National Task Force on Information Technology. The central facilities, the infrastructure groups, the training institutions and entities at the village level were set up simultaneously. The costs have been high. The process is still working itself out. It is too early to compare and evaluate. A good strategy would be to provide seed funds for components and study the outcomes, to see if more general programmes can be worked out.

Pravara has also submitted for recognition at Delhi a project to set up a degree–granting Information Technology Institute, with initial funding but ultimately self–financing. It would technically support the HRD/ Production/ Infrastructure institutions and also study and re–engineer the village systems on a real–time basis. Pravara is lobbying hard to get the proposal approved.

Post Script

The emphasis on institutional change for widespread growth and application of technology in this paper does not mean that large, mission–oriented projects are not important in the growth process, particularly in large third–world countries. Tissue cultures in tree crops and hybrid paddy rice are cases in point. Hybrid paddy in the People’s Republic of China and India has yield levels of around seven to eight tonnes per hectare and is the precursor to genetically modified super rice. Indian agricultural science has released around 400 varieties to date; this is the basis of India’s agricultural performance. The use of the space industry as a product in the village IT projects is clear. A recent study sponsored by the French Institutes in India has shown the critical role of nuclear power if the carbon emission problem is to be kept in check (see Schwank *et al.* (2000) and foreword by Alagh in Audinet, 2000 and Alagh, 2000*b*). The Indian programme of completing the nuclear fuel cycle based on the country’s abundant thorium reserves has to be seen in this light. The experimental fast–breeder reactor, Kamini, currently generating energy with thorium, is now being upgraded to a 500 MW facility.

Notes

1. Although this paper was written independently, it is interesting that the theoretical paper written for the Forum (Bussolo and O'Connor, the first chapter in this volume) discusses the same agenda, namely the green revolution technology and beyond into biotechnology, non–agricultural rural growth and use of information technology for poverty removal. Poverty and technology is a difficult area, but perhaps there is a beginning of a research tradition to follow.
2. Maurice Strong has described the conferences at Founex in 1971 and the Hague in 1991 as the "two seminal meetings on environment and development".

Bibliography

Alagh, Y. (1988), "Guidelines for Agroclimatic Planning: A Draft for Discussion", *Journal of Land Development*.

Alagh, Y. (1989), "The NIE's and the Developing Asia–Pacific Region", *Asian Development Review,* Vol. 7 (2).

Alagh, Y. (1991*a*), *Indian Development Planning and Policy,* WIDER Studies in Development Economics, Vikas, Helsinki and Delhi.

Alagh, Y. (1991*b*), *Sustainable Development, From Concept to Action: Techniques for Planners,* UNCED, N.Y.

Alagh, Y. (1995), "India's Agricultural Trade with the ESCAP Region", UN, ESCAP, *Agricultural Trade in the ESCAP Region,* UN, New York.

Alagh, Y. (1999*a*), "Participatory Institutions and Rural Roads", UN, ESCAP, *Transport and Communications Bulletin for Asia and the Pacific*, No. 69, UN, New York.

Alagh, Y. (1999*b*), "India's Agricultural Trade", *Indian Economic Journal,* First Dantwala Memorial Lecture.

Alagh, Y. (2000*a*), *Report of the High Level Committee on Legislation for Corporatisation of Cooperatives,* Ministry of Company Affairs, New Delhi.

Alagh, Y. (2000*b*), *Sustainable Development: India 2020*, UNU/IAS, Tokyo.

Alexandratos, N. (ed.) (1995), *World Agriculture Towards 2010, An FAO Study,* Wiley, Chichister.

Asian Development bank (ADB) (2000), *Rural Asia: Beyond the Green Revolution,* Manila, ADB, and *Rural Asia: Companion Volumes (I–III),* Oxford University Press, Oxford.

Audinet, P. (ed.) (2000), *India's Energy: Essays on Sustainable Development*, Manohar, Delhi.

Chopra, K. and G. Kadekodi (1993), "Watershed Development", *Economic and Political Weekly*, June 26.

Desai, R.D. (1995), *The Household Sector; A Study of the Zari Industry,* Har Anand, New Delhi.

FAO (1978/81, 1982), *Agro–Economic Zoning Atlas*, FAO–UNESCO, Rome.

FAO (1993), *Agriculture Towards 2010*, FAO, Rome. For the final published version, see N. Alexandratos (ed.) above.

GOVERNMENT OF INDIA, PLANNING COMMISSION (1989), *AgroClimatic Planning: An Overview,* New Delhi.

HAYAMI, Y. (1981), *Understanding Village Community and the Direction of Agricultural Change in Asia*, IEG. Occasional Paper, New Series, No. 1, Delhi.

HOULLIER, F., V. BENER AND L. KENNEDY (eds.) (1994), *Industrial Decentralisation and Urban Development in India,* Institute Francais de Pondicherry, Pondy Paper in Social Sciences, 23, Pondicherry.

KASHYAP, S.P. AND R.S. TIWARI (1985), *Shaping of Diamonds in Surat: An Enquiry into Some of its Passas (Facets),* SPIESR Monograph No. 12, Ahmedabad.

KASHYAP, S.P. AND R.S. TIWARI (1992), "Growth of Small–size Enterprises in India: It's Nature and Contents", *World Development,* Vol.16, No. 7.

KASHYAP, S.P. AND R. S. TIWARI (1998), "Recent Development in the Small Enterprises Sector in India", Discussion Paper No. 48, ILO, International Institute of Labour Studies, Geneva.

LELE, U., N. KUMAR, Y.K. ALAGH, N. SAXENA AND K. MITRA (2000), *Forestry in India: An Evaluation*, World Bank, Washington, D.C.

MISRA, R.P. AND K. MISRA (eds.) (1998), *Million Cities of India: Growth Dynamics, Internal Structure, Quality of Life and Planning Perspectives,* Pondview Books.

PETRELLA, R. AND C. GRANRUT (1992), *La Mondialisation de l'Economie*, FAST, European Commission, Document No. MO 75–5/34, Brussels.

PYKE, F. (1992), *Regional Development in an Era of Globalisation,* ILO, International Institute of Labour Studies, Geneva.

RESERVE BANK OF INDIA (2000), *Report of the Expert Committee on Agricultural Credit* (Kapur Committee), Delhi.

ROY, N. AND Y.K. ALAGH (2001), *Community Information Centres for the Rural Poor*, Pravara, SSRI.

SACHS, I. (1991), "Background Paper for the Hague Declaration**",** reprinted in *Nature* and by RIS.

SCHWANK, O., T. VON STOKER AND N. NORTH (2000), "Long Term Carbon Emission Targets", *in* P. AUDINET (ed.), *India's Energy: Essays on Sustainable Development*, Manohar, Delhi.

SENGENBERGER, W. AND F. PYKE (eds.) (1992), *Industrial Districts and Local Regeneration,* ILO, International Institute of Labour Studies, Geneva.

STOPFORD, J.M. (1994) "The Impact of the Global Political Economy on Corporate Strategy", Carnegie Bosch Institute, Working Paper No. 94–7, Pittsburgh.

TAYLOR, L. (ed.) (1993), *The Rocky Road to Reform*, MIT Press, Cambridge, Mass.

VAIDYA, C. (1999), *Private Sector Participation in Financing and Management of Urban Water Supply and Sanitation Projects***,** USAID FIRE Project, reprinted in 31st Annual IWWA Technical Volume, Delhi.

WADE, R. (1992), "East Asia's Economic Success", *World Politics*, Vol. 44.