CHAPTER - II
Review of Literature, Present Scenario and Investment in Agricultural Research and Education

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CHAPTER - II
Review of Literature, Present Scenario and Investment in Agricultural Research and Education

Research pertaining to any sort of problems and solutions needs an in-depth knowledge of the concerned area. The present research project requires a rigorous review of the studies already made in agricultural education and financial investments by the government as well as the NGO's. Review of literature is of extreme importance in the research studies because of the following reasons:

1. The review of literature with reference to the particular area of study provides a wider knowledge of the concerned subject.
2. The endeavor gives the guideline (premises) to the scholar to proceed in right direction for dwelling upon the research programme.
3. It provides the opportunity for determining the objectives for the study.
4. The review of literature helps the researcher to interpret and discuss the findings of the project by supporting or contradicting the results and suggestions of the earlier studies.

On the basis of above given points the present chapter (Chapter II) is devoted to the review of literature keeping in view the requirements of the research project.

The review regarding the financial investment in agricultural education in India has been made since 1951 and the data taken for 8 years period of 1993 –2001 pertaining to all the State Agricultural Universities.

According to Varma, A 1998 Agricultural Education started as indicated below:

1877: First agricultural school at Saidapet, Madras.
1878: First agricultural school shifted to Coimbatore and converted into agricultural college.

1924: Students enrolments: 30

1948: Enrolments 1448 in 17 agricultural colleges

1958: Post Graduate School at IARI

1960: First SAU at Pantnagar

1992: Enrolments 21266 in 250 Agricultural colleges

The Indian Agricultural Education system was started based on the Land-Grant system of the US. The concept of SAUs has come into the existence and about 35 formal agricultural universities exist now to impart agricultural education and train the manpower for agricultural purpose.

"A University stands for humanism, for tolerance; for reason, for adventure of ideas and for the search of truth. It stands for onward march of the human race towards even higher objectives" by Jawaharlal Nehru, 1947 (Convocation Address, Allahabad University)
Table – 2.1: Growth of agricultural Institutions in India (Verma, A. 1998): 

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Some Concerns of Agricultural Education according to Verma, A. (1998):

- Higher education is unsatisfactory
- Average standards have been falling
- Rapid expansion has resulted in lowering of quality
- No serious attempt to measure standards has been undertaken.
- Quality of higher education does not match international standards.
- A majority of teachers teach mechanically and listlessly – mainly due to lack of interest in the area of teaching.
- Absence of ‘research impregnated’ atmosphere dissuades even motivated teachers leading them to indifference.
- Atmosphere of distrust between senior and junior teachers.
- Bureaucratic structure, dependence on the approval of indifferent superiors.
• Academic excellence in confined to a minority of teachers.

Problems related to students as stated by Verma, A (1998):

• First generation learners on the increase.
• Inadequate secondary education.
• Lack of interaction between students and teachers.
• Inadequate knowledge of English.

Popular Research Guides

• Frame the Ph.D. programme to be conservative for guaranteed results.
• Avoid difficult and challenging areas.
• Encourage early publication of even incomplete work.
• Select external reviewers on the basis of certainty.

Rejection of thesis by the examiners is a rarity

Disincentives for teaching:

• Universities take credit for their teaching programmes, but are not willing to improve funding.
• No credit for teaching, under the reward systems based on ‘publish or perish’
• Lack of lateral career movement.
• Lack of financial award.
The 21st century work force would require skills for

- Solving complex and open-ended problems.
- Sustaining growth and environment.
- Dealing with uncertainties.
- Probing the unknown.

Under this setting only those who have been educated in discovery rich environment would thrive.

What needs to be done?

- Provide a well-rounded education.
- Enhance student's information literacy.
- Develop interdisciplinary teaching modules.
- Attract top faculty and motivate them to foster creativity among students.
- Attract students on distinctive curriculum rather than prestige.
- Each university must choose its direction.
- Integration of teaching and research.
- Improve funding and infrastructure.

Improvement in Teaching:

- More flexibility in the courses.
- Reduce formal instructions.
- Increase tutorial work, group discussions, seminars and independent study.
- Discourage cramming
- Stimulate curiosity, problem solving ability and originality.

Post Graduate education should aim at development of independent, creative approaches to problem solving and experimental learning.

Human resources development is vital for effective productive output. India being basically a rural and agro economy, there is need for more attention on this aspect. This concept is more applicable in agricultural sector. The skill imparting, developing and equipping the young graduates leads to greater participation. They need a shift from Information based syllabus (curriculum) to skill-based curriculum in an education system particularly in agriculture. Promotion of excellence in frontier areas of science like Biotechnology, Information Technology etc. is also essential. Since the economy is getting transformed into industrial economy, there is more scope for agro industry besides agriculture.

The transformed economy and agricultural industry economy demand more and greater human skills. This need has been identified and accordingly more attention is being paid in the successive plan periods. The expenditure otherwise is known as investment towards the education of agriculture, constitutes a greater part from the states. The contribution by the Government of India is also increasing continuously. New institutions have come up. The learning techniques, and teaching methods are rapidly changing. At present there are about 200 colleges working under SAUs (about 40) and 50 colleges are affiliated to the other institutions / Universities. The total intake of students at the graduation, post graduation and Ph.D are about 20,000 a year.

Food grain production reached to 206 million tones from 51 million tones in early 50's. Agriculture being a traditional occupation in India occupies greater
place in the economy. It contributes 35% of the GDP. In India over 200 million agricultural farms engage a large number of farm workers. Strengthening rural development is possible only through the agriculture. Efficient utilization of resources and conservation of resources like soil, water and bio-diversity is possible only through the skilled manpower. Vast areas of the land remain unutilized and vast water resources also have not been utilized effectively. Similarly environmental hazards have developed with reckless industrialization and resources have not been utilized positively for the benefit of the society. Land utilization and arresting of degradation of land and reclamation of the degraded lands are possible through advancing the human skills. Further, agro forestry and social forestry can also play key roles. For sustainable agriculture, trained/ skilled manpower is the vital requirement.

- Training of faculty at national and international level.
- Infrastructure development in participating universities.
- To conduct All India Level competitive examinations for 15 and 25% seats at UG & PG Level courses to eliminate inbreeding.
- Review and revision of the course curriculum etc.

About 65 disciplines are being taught across the universities. About 13000 students have been admitted at UG level and 6000 at PG Level by the SAUs. About 200 - 500 students from other nations are being admitted.

Rashid Suleman (1996), in his paper on "Agricultural education in India: problems and policy imperatives" advocated for the rapid growth of agricultural education in the country. For that he suggested more financial investments for improving the laboratories, libraries, etc. He further recommended that the Indian Govt at all levels might provide opportunity for better agricultural education. He was of the view that agricultural education and investment on it need investments by the institutions and the NGO's. In his paper, Suleman suggested uniform curriculum to the whole country keeping in view that uniformity should be up to
80% of the curriculum and 20% deviation might be made for making temporal adjustments. In addition to these, he also emphasized vocational education in agriculture and allied areas.

There was a World Food Summit under the umbrella of FAO in 1996. In this summit the evolution and prospects of investment in agriculture was discussed through technical background. In this document the present and the future levels/source of agricultural investment was also discussed. The paper had thrust upon investment in agriculture and its financing inconsistency with reference to economic and financial viability. This paper discussed various kinds of assistance that are provided to the different agricultural segments in developing countries.

Dr. Swaminathan a legendary figure in agricultural arena, in his report to the Ministry of Agriculture made 25 recommendations regarding educational needs and opportunities in the country in agricultural sector. These recommendations are:

1. Farm graduates for the new millennium merely oriented towards quality education and research programmes.

2. "Empowerment of Women" should be the key area to rural prosperity.

3. 'End to End Approach' aiming at agricultural intensification, diversification and value addition in an integrated manner.

4. "Global Competitiveness" on the basis of WTA, TRIPRS and the global conventions on climate, biodiversity and desertification.

5. Harnessing frontier science and technology keeping in to view the areas of biodiversity, space technology, information technology, renewable energy management, agricultural economics and agribusiness management.
6. To make strong partnerships and associations among the State Agricultural Universities and other educational institutes at state & central level to face the future challenges with all dexterity.

7. There is a need for greater emphasis in the following areas: teaching, training and retraining.

8. Land and water use planning and management of climatic input on agriculture.

9. Integrated development of crop and animal husbandry, fisheries and forestry.

10. Users orientation to agricultural education: practical operations in urban as well as rural programmes, pertaining to agriculture and horticulture.

11. Non-degree training programmes based on market preference and needs.

12. Computer aided extension and information to transmit the relevant modern information to the un reached.

13. Manpower planning on the basis of long as well as short-term perspective needs for multi purpose farming.

14. Fisheries education and training in inland and coastal areas.

15. Education for sustainable agriculture.

16. Feasibility of introducing agriculture in school at 10+2 level and pre high school level.
17. Improving education in agricultural colleges by assessing their potential and infrastructure.

18. Distance education and harnessing the tool of the information technology.

19. Enhancing the social relevance of agricultural education can eradicate poverty, greater incredibility, malnutrition and regional imbalance.

20. Personnel policies for remedying regional imbalances


22. Centres for Advanced Studies need perennial efforts for excellence and improvement.

23. Since agricultural education is a state subject, it is fundamental responsibility of state governments to provide a major part of financial support for agricultural education.

24. Fifty years ago, Jawaharlal Nehru said, 'Everything else can wait but not agriculture'. The experience of the last 50 years shows that wherever there is satisfactory agricultural progress, there is alleviation of poverty and increased livelihood security. Hence, it is in the national interest that agricultural education receives overriding priority.

Education for Agriculture: Bridge to a Century of Hope on the Farm Front

Nutrition and education hold the key to sustainable human development. Countries which under-value their human resource and overvalue their physical resources tend to remain poor. About 60 years ago, Mahatma Gandhi made the following observations while addressing youth who wanted to serve rural India. 'The fact is that the villagers have lost all hope. They suspect that every
stranger's hand is at their throats and that he goes to them only to exploit them. The divorce between intellect and labour has paralysed our agriculture. The worker should enter a village full of love and hope, feeling sure that where men and women labour unintelligently and remain unemployed half the year around, he working all the year round and combining labour with intelligence cannot fail to win the confidence of the villagers'. This message is as relevant today as it was 60 years ago. Integrating brain and brawn in farm enterprises should hence be the major purpose of agriculture education.

As we celebrate the 50th anniversary of our independence, we can look back with pride and satisfaction on the progress made by the country in the fields of agricultural education and research through ICAR institutions and State Agricultural Universities. The food, health and livelihood security of the nation depends upon sustained progress in crop and animal husbandry, fisheries, forestry and agro-business and agro-processing industries. Over 100 million new livelihoods have to be created during the next 5 to 6 years. In the coming millennium, more food and other agricultural commodities will have to be produced from diminishing per capita arable land and irrigation water resources and expanding biotic and abiotic stresses. Above all, ours is a land of the youth. Youth can be attracted and retained in rural occupations only if farming becomes intellectually satisfying and economically rewarding.

Women contribute more than 50 per cent of the agricultural work force. There is increasing feminisation of agriculture, particularly in hill areas. Women's technological empowerment is essential for both reducing drudgery and increasing income. Hence a major emphasis has to be accorded to women's education and training.

Although the contribution of agriculture to GDP is going down, the farm sector provides over 65% of the job opportunities. It is in this context that our Agricultural and Animal Sciences Universities and ICAR Institutions occupy such a pivotal position. Our recommendations for strengthening and reorganising
agricultural education are designed not only to ensure sustainable food and livelihood security for our country but also to take the country to a pre-eminent position in global agricultural trade.

The 25 recommendations cover a broad spectrum of educational needs and opportunities, ranging from Panchayati Raj institutions and Krishi Vigyan Kendras to post-graduate centres of excellence. If implemented, they can help to enhance the national relevance and global competitiveness of our agricultural education system. Therefore, it is suggested that an empowered committee consisting of representatives of ICAR, SAUs, Planning Commission, Department of Agriculture and Ministry of Finance may be constituted for taking speedy action.

The steps recommended are designed to make the new millennium a century of hope for rural and tribal women and men.

Recommendations of the Committee on Agricultural Education:

1. Farm Graduates for the New Millennium:

The major aim of Agricultural Universities during the 9th Five Year Plan period should be re-orientation of their educational and research programmes to meet the challenges of sustainable agriculture and food security. The farm graduates should be in a position to help in achieving the concept of food security given earlier. Such a restructuring will involve training of students in the principles of ecology, gender and social equity, economics and employment generation. Farm graduates should be well-versed in the science and art of sustainable agriculture and agribusiness. Their major ambition in life should be to take to farming and agro-business as viable economic enterprises. The mission statement of SAUs should clearly state that a major goal of SAUs is to equip men and women scholars to take to a career of self-employment. For this purpose, they should achieve computer, patent and trade literacy and also become sensitive to socioeconomic conditions.
2. Women’s Technological Empowerment

This holds the key to rural prosperity and household nutrition security. Home science education needs to be totally reorganized. The training during the first three years can deal with general topics in science and nutrition. The final year should provide a number of options such as management of biodiversity and biotechnology, seed technology, food technology, renewable energy management, information technology and GIS mapping. The term ‘home science’ has come to mean only preparation of women for home occupations. Therefore, there is a need to find another alternative name for Home Science Colleges like "College of Agricultural Technology and Nutrition for Women" or any other suitable title which captures the goal of the college, namely the technological and skill empowerment of women in market driven technological enterprises and the sustainable management of natural resources. At the same time, the gender dimensions of agricultural development should be internalised in the syllabus, so that the male students become aware of the need for gender equity and justice in dealing with issues such as agrarian reform, land rights and marketing arrangements. There is also need for reducing drudgery in the professional life of working women. Efforts should be made to reduce the number of hours of work and to add economic value to each hour of work in the case of women labour.

3. End to End Approach

Agricultural Education should aim to help farm graduates to undertake the tasks of agricultural intensification, diversification, and value addition in an integrated manner. The graduates should become job creators and not remain job seekers. They should be well versed in the creation of more skilled on-farm and non-farm livelihoods. This would then require an End-to-End Technology Mission Approach, linking production and post harvest technologies in a mutually reinforcing manner. In order to train agricultural
graduates in running agro-business and enterprises, the Agricultural Universities should set up Agricultural Technology Parks. This will help to establish the economic viability of new technologies and these Parks could promote technology incubation and dissemination. Such Parks linked to appropriate public and private sector enterprises from the point of view of marketing arrangements will help to enhance the self-confidence of farm graduates and stimulate them to take to a career of self-employment.

4. Global Competitiveness

Farm graduates should be given a course on international agriculture and the implications of the World Trade Agreement, Trade Related Intellectual Property Rights (TRIPS) and the global conventions on climate, biodiversity and desertification. As mentioned earlier, they should become literate both in computer technology and in patents. Computer, patent and trade literacy are essential for every farm graduate. They should be helped to gain confidence and competence in capturing global markets in farm commodities. All SAUs should be connected to NICNET and Internet, so that farm graduates can be exposed to the power and speed of modern information technology. Post-graduate students should be adequately equipped to get international jobs in agriculture. In this connection, the Indian Agricultural Research Institute has taken an initiative in organising a course on International Agriculture. Farm graduates should be familiar with international standards like ISO 9000 and ISO 14000.

5. Harnessing Frontier-Science and Technology

Science is progressing at a very rapid rate. Agricultural Universities should review their personnel policies in order to attract and retain outstanding scientists in the areas of biotechnology, space technology, information technology, renewable energy management, agricultural economics and
agro-business management. There is at present too much of inbreeding in Agricultural and Veterinary Sciences Universities. This is not conducive for promoting excellence and for helping the country to take the steps needed to meet the challenge of having to grow more food, and other agricultural commodities from diminishing per capita arable land and irrigation water resources.

6. Human Resource Development

There is a need for greater efforts in the following areas:

- Teacher training and retraining: Normally the tendency has been one of changing the syllabus, with the teacher competence remaining the same. It is important that teachers are continuously updated and their skills upgraded so that they can inspire students in promoting the cause of sustainable agriculture and rural development. Also, induction training should be given to the newly appointed teachers in SAUs.

- With an increase in the average life span, there are great opportunities for deriving benefit from emeritus scientists and retired professionals. A structured method of tapping this underutilised brain and skill bank should be developed. In science, experience that grows with age can be an asset to the younger generation. Retired scientists may often be in a position to work and teach in economically and ecologically under-privileged regions. Hence, their expertise should be mobilised for launching a movement for Science for Remedying Regional Imbalances in agricultural development.

- NAARM should be suitably strengthened and encouraged to start a few Regional Centres in the campuses of SAU's on the basis of a careful assessment of needs.

7. User Orientation to Agricultural Education
There has to be a clear understanding of the purpose of agricultural education. First, some farm graduates may go for post-graduate education and take to a career of research and education. Secondly, some may go to work in State Departments of Agriculture, Animal Husbandry and Fisheries as Extension Officers. Many may opt for taking to practical farming and agro-business enterprises. Even at the time of admission there has to be a clear understanding of the purpose for which a student has joined the SAU. This will help to equip the candidate in his/her chosen area of profession. For example, those who are going to live in urban areas could have a one-year training programme on urban agriculture and horticulture, so that they can help to promote an urban green-belt movement.

8. Non-degree Training Programmes

There is need for a variety of Non-degree training programmes based on both market preferences and the need for upgrading the skills of in-service candidates drawn from educational and research institutions and extension departments. Non-degree training programmes offer opportunities for life long education. They should also be open to the staff of non-governmental organisations.

9. Manpower Planning

This area should be looked at from both a short and a long-term perspective. In the long term the aim should be to have at least one farm graduate available to each Panchayat and Nagar Palika to serve as a multi-purpose farm consultant. Initially they can work either whole time or part time depending on needs and circumstances. Sustainable agriculture is highly knowledge intensive and hence, it is important that in the long term, all Gram Panchayats/Mandal Panchayats/Zilla Parishads and Nagar Palikas have at least one agricultural consultant on a regular basis. If this
pattern is to be followed the requirement for farm graduates will be over seven lakhs. This should be our ultimate goal. During the 9th five year plan, the estimates made by NAARM on the demand for farm graduates and postgraduates could be taken as the basis for deciding admission policies. However, discipline by discipline analysis will be needed at the post-graduate level. There is at present a high degree of regional variation in the availability of farm graduates. Almost one farm graduate is available for every 2 to 3 villages in Kerala. In contrast, in Bihar one farm graduate is available only for every 100 villages. While deciding on investment in further agricultural education, such regional disparities should be kept in view. There should also be a method by which the knowledge and skills of such graduates are continuously updated.

10. Fisheries Education

In view of the environmental problems associated with coastal aquaculture, there is need for including in the syllabus of fisheries colleges, courses on eco-friendly fish farming systems. Practical training in ecological aquaculture both in inland and coastal areas as well as sustainable fisheries should be introduced by CIFE, Mumbai. All course work for different degrees in fisheries at the ICAR level should be done at CIFE. Other institutions like CMFRI, CIFA, CIFRI, and CIFT etc. could be utilized for carrying out the thesis work for graduate degrees. This will help to avoid duplication and improve the efficiency of education. CIFE could serve as the nodal institution of a National Fisheries Education Network and should draw upon Visiting Faculty members. With the coming into force of the UN convention on the Law of the Sea, India has over 2.01 million sq.km of exclusive economic zone (EEZ). Since India is a Member of the Commission on Conservation of Antarctic Marine Living Resources (CCAMLR), manpower development in deep sea fishing will be necessary. Fisheries graduates should become well versed in deep sea fishing techniques and in the conservation of living aquatic resources in all these
areas. They should also be trained in post-harvest handling, processing, packaging and marketing. The monitoring and control of fresh and seawater pollution should receive adequate attention in the syllabus for fisheries graduates. The need for conserving fish genetic resources and for protecting coral reefs, sea grasses and mangrove forests should be emphasised.

11. Education for Sustainable Agriculture

It is necessary to develop indicators that could be utilized by farm graduates to measure the environmental impact of new technologies. Reliable quantitative indicators will help to measure and monitor the long-term sustainability of the use of natural resources like soil and water. In the interest of sustainable farming, it is also necessary to promote the cultivation of the most ecologically adapted and efficient crops particularly in rain fed and dry fanning areas. Unfortunately, millets, which do well under such conditions, are termed as 'coarse cereals'. Such millets are often rich in iron and micronutrients and should be termed as 'Nutritious crops'. This will help to emphasize their nutritional and conservation importance. Agronomists should express yield not only in terms of area but also in terms of irrigation water utilised. Since ground water is now meeting more than 50% of the irrigation water needs, the sustainable management of the aquifer should be given importance in the syllabus.

12. Feasibility of introducing agriculture in schools at 10+2 level and pre-high schools

A large segment of our population directly or indirectly depends on agriculture for their livelihoods. It is therefore essential that education in schools should be more relevant to occupational and real life needs. Although work experience and socially useful productive work have been introduced in school curriculum, this has not helped to address the real issue of awareness
about newer agricultural technology innovations. It is recommended that
during pre-high school level at different stages, course curriculum should
have some component of agriculture so that students gain awareness of
modern agriculture. Agricultural education at school level should focus on
providing basic theoretical knowledge in the field as well as introducing the
learners to basic application and skills. In view of the already heavy course
load, a separate subject of agriculture is not considered feasible. However at
10+2 level, agriculture could be introduced as an additional optional subject.
For students from Navodaya schools and from rural areas, agriculture can
become the field of specialisation at the +2 level. The career guidance
centres of SAUs should undertake parent education on the importance of
agricultural education. The objective at pre-high school level and +2 level
should be as under.

Pre-high school level

- to introduce learners to the basic knowledge associated with
  natural resources management
- to develop them in certain pre-vocational and vocational skills
  involved in agriculture,
- to inculcate values associated with sustainable development.

10+2 level

- to prepare trained personnel in various vocations associated with
  the production and post-harvest phases of agriculture and
  aquaculture
- to provide training in the ecological foundations of agriculture.
- to enable young students to acquire computer and trade literacy.
- to help bright students to pursue higher studies in agriculture.
13. Improving Education in Private Agricultural Colleges

At present about 48 private colleges/institutions are offering degree programmes outside the State Agricultural University System. These do not have adequate infrastructure and facilities for imparting practical skills and training. Many of these institutions are very old and keeping them outside the purview of accreditation is leading to churning out of ill equipped graduates. There is need for improving educational standards. In view of various administrative problems, these colleges cannot be made as affiliated colleges of SAUS. Despite this, substantial improvement in education in these colleges is possible by giving the responsibility to SAUs for the limited purpose of conduct of examinations and enforcement of common curriculum. It is also necessary to introduce a uniform system of education with regard to admission through entrance examination, duration of degree programmes and evaluation and grading in line with SAUs. Refresher courses could be organised for updating the skills of the staff from these colleges in SAUs and ICAR institutions. ICAR should provide guidelines for monitoring and accreditation for private agricultural colleges as it is giving for SAUs. To enforce these structural changes, it is important to provide some development grants for improvement of library, laboratory equipments and farms and for the establishment of an educational technology. Such colleges need to be assessed for their potential and those that do not have minimum Infrastructure need to be closed, while others could be supported and brought into the mainstream. An Expert Committee may be constituted by the ICAR for this purpose (Agricultural Education – 40 years).

14. Distance Education and Harnessing the Tools of Information Technology

In view of large number of dropouts in schools and the fact that a major segment of the rural population is still un reached so far as new agricultural technology is concerned, it is of paramount importance that
SAUs and ICAR institutes be given the responsibility of training of such rural youth by way of distance education. The aim should be to reach the un reached particularly women. This will also lead to major gains in new technology adoption leading to higher productivity without ecological harm. For this purpose the Committee recommends that SAUs should establish an independent cell for distance education, develop programmes for training of rural youth for imparting newer skills in agriculture and allied sciences so that they are able to improve farming. It is suggested that five Agricultural Education Media Development Centers be established to develop capsules for dissemination of knowledge in agriculture and allied sciences through television and use of multi media as a part of distance learning. Information empowerment is essential for improving agricultural production through the improvement of productivity per units of land, water and time. In the short term, production can be increased only by bridging the gap between potential and actual yields even at currently available levels of technology. In this context, distance education assumes importance.

15. Enhancing the Social Relevance of Agricultural Education

Present day educational policy has not addressed the issue of social relevance in totality. Issues like poverty, gender inequity, malnutrition, sustainability and regional imbalances fall in this category. The curriculum must cover these areas to substantially focus on economics, equity, agribusiness, agricultural marketing, value addition, international trade and other related disciplines. Agricultural education has to get out of its mould of a rigid framework and has to take on the role of continuing education where the education process is adjusted to the needs of illiterate, unskilled farmers and farm households. This would imply that the individual farmer should have access to agricultural education facilities at different stages of his/her life. It would also mean that the educational process has to be more directly related to local conditions and should be made more socially
A number of studies show that education and acquisition of functional skills are intimately related with agricultural growth and agrarian prosperity. Women farmers need special attention with reference to skill empowerment. The situation with regard to literacy is equally disturbing. The situation in respect of tribes and other weaker sections of the society is much worse. Increasing financial resources is only a partial solution to this lapse and concerted efforts are required to restructure education programmes so as to include the excluded.

16. Uniformity in Educational Standards

The Committee took note of the prevailing disparity in grading, standards, course curriculum, duration of course, start of academic session etc. and recommended that conscious efforts be made to improve the standard of education, bringing uniformity in grading, mode of admission, duration of courses etc., in accordance with the Third Deans’ Committee Report. The Accreditation Board set up recently must be strengthened and provided enough capacity for enforcing norms and standards of education.

17. Centers of Advanced Studies

The Centre of Advanced Studies established during VIII Plan need to be continued and further strengthened during the IX Plan in view of their excellent role in generating trained personnel for improving the competence of the faculty in new and frontier areas of science. Advanced schools of education and research are particularly needed in the fields of biotechnology, information technology, space technology including agricultural meteorology, renewable energy technologies and management technology.

18. Financial Support
Since agricultural education is a State subject, it is the fundamental responsibility of State Governments to provide a major part of financial support for agricultural education. Education is basic for improving the economic conditions of rural families and ensuring required agricultural growth. ICAR presently functions like UGC for State Agricultural Universities. Therefore, it has the responsibility to provide supplementary grant for bringing about improvement in educational standards in SAUs. One per cent of the GDP both at the Central and State level should be earmarked for agricultural research and education, of which at least 20 per cent both at the Centre and the State should go for agricultural education. Further, the Central Government has major responsibility to support agricultural education in the country. The Committee proposes a multidimensional financial support system wherein the Universities also must raise resources particularly from the private sector and rich farmers. The ICAR should provide adequate development grants and State Governments should provide full support for the establishment costs including development of student's laboratories and field facilities. Agricultural education is the cornerstone of sustainable and sustained agricultural progress. Hence, there is need for adequate financial support from the Central and State governments to SAUs, so that they can help our farm men and women to improve the productivity, profitability, stability and sustainability of major farming systems. We also recommend that all large agricultural development projects, particularly in the area of irrigation, should include in their budget provision for research and training. Had this been done in the past, we will not be facing the problems of salinity and water logging in several major irrigation projects. A proactive action is needed in such cases.

19. The committee recognises that funds alone will not help to improve the quality of education and the motivation of students and, teachers. A learning and questioning environment is essential. Universities should
keep in view the following message of Guru Dev Rabindranath Tagore in Gitanjali

"A candle which is not lit cannot light others; A teacher who is also not learning cannot teach others".

If SAUs and ICAR institutes imbibe this message, we can achieve a learning revolution in agriculture. ICAR should organize at periodic intervals orientation programmes for Vice-Chancellors/ Deans and Directors and other officers on methods of imparting sustainable dynamism and social relevance in all areas of agricultural education, ranging from KVKs to post graduate centres. We should not be satisfied with anything but excellence in mobilising the power of education for sustained agricultural progress and agrarian prosperity.

Fifty years ago, our first Prime Minister, Jawaharlal Nehru said 'Everything else can wait but not agriculture'. The experience of the last 50 years shows that wherever there is satisfactory agricultural progress, there is alleviation of poverty and increased livelihood security. Hence, it is in the national interest that education for agriculture receives overriding priority.

In a status paper presented in an International symposium on Agricultural Education in Next Century, Sawant.A.G, (1999) has fully endorsed the grand success of Land Grant colleges of Agricultural system in USA. Similar attempt in India has also brought tremendous development in the areas of education, research and extension of agriculture. Though this system has provided good number of undergraduate, postgraduate and Ph.D students. Sawant stressed the need for re-orienting the Land Grant model in India. However, the following weaknesses have crept in:

1. Proliferation of Agricultural Universities: The concept is to have multi disciplinary approach in the university. However, since more universities are established in each state and there is tendency for establishing
discipline-based universities, the idea of multi disciplinary approach has deviated.

2. Inbreeding: Since the universities have been established on regional basis, admission is automatically restricted to the local population. This has defeated the purpose of these universities. Similarly, Inbreeding is also observed in staff recruitment that has reduced the gap between the teacher and the taught, and thereby created adverse impact on the educational system.

3. Lack of uniformity

4. Duplication of research

5. Neglect of basic research

6. Inadequacy of extension services

7. Wasteful utilization of land

The above weaknesses have brought heavy pressure on the available finances, and hence financial constraints have become a regular feature of these universities. To sustain these colleges, the government has to provide 100% financial support for the development of these resources besides providing the land. However, with the passage of time and with the increase in the number of SAUs, the governments are finding it difficult to provide adequate finance to each of these universities.

Sawant (1999) also observed that the flow of students from rural areas to the agricultural education programme is declining. This is because of the lower standard of the rural school education. The country being agriculturally
dominated and majority of the population still live in rural areas; this issue needs attention. Similarly Sawant also observed that the women agricultural graduates have increased from 1.1% in 1981 to 6.4% in 1995. This issue also needs to be addressed. Sawant has suggested uniform admission procedures and creating more awareness about the agricultural education programmes and the potential avenues of agricultural education and its importance. The movement of students and staff from one university to another is to be encouraged.

M.B. Dastagiri and Linu Philip in their research paper "Rural Urban Linkages through Farm and Non Farm Linkages in India" published in Rural Development concluded that the household investment in Farm and Non-Farm business by rural household was found to be negative because of the low level of capital formation in agriculture.

Suresh K. Sinha (2000) in his paper on "Education for Agriculture in India: time for a change" has concluded that though we have adapted Land Grant colleges University system of the USA, there is a clear distinction between the education system of USA and India. In the USA no exclusive agricultural university was established whereas in India while adapting the Land Grant college/university system we have established a distinct agricultural university system. Hence overall education system has been isolated from the agricultural education. He has also stressed that rural development that ought to have been important and knowledge generation in Agricultural universities were not touched upon. Hence it is time for reviewing agricultural university system for quality and excellence.

"Impact of agricultural Human Resource Development Process of TNAU", a compendium stresses the need for upgrading the quality and standards in agricultural education. The compendium also indicates lack of modern management systems, poor libraries and teaching facilities. The reasons are the falling quality of agricultural education.
The World Conference on Higher Education, 1998, organised by UNESCO on the eve of the next century presents a valuable opportunity for us to place India's national perspective of higher education before the international community.

Multisided awakening, creativity, renewal and reconstruction enabling the country to make valuable contributions in the services of her people and the peoples of the world have marked India's renaissance, which began in the last decades of the 19th century. Our culture has always stood for universality and common fraternity of the entire human race, and our aspirations are reflected in the educational field in creating, strengthening and developing a national system that should be geared to the highest ideals of universal peace, unity and harmony.

We maintain that education is a liberating force as also an evolutionary force, which enables the individual to rise from mere materiality to superior planes of intellectual and spiritual consciousness. Education is a dialogue between the past, present and the future, so that the coming generations receive the accumulated lessons of the heritage and carry it forward. In the words of Sri Aurobindo, the foremost philosopher and sage of our times, "The past is our foundation, the present our material, the future our aim and summit. Each must have its due and natural place in a national system of education."

Despite serious handicaps of means and resources, the country has built up during the last 50 years a very large system of education and has created a vast body of men and women equipped with a high order of scientific and technological capabilities, robust humanist and philosophical thought, and creativity.

Though riddled with explosion in the growth of population, a large illiterate population and problems of economic poverty affecting one-third of the people, modern India is still set to forge a bright future and to contribute significantly to the higher goals of world peace, human unity and universal welfare. Much credit for this goes to the ancient but ever-young spirit of the nation and to what higher
education has striven to fashion in terms of determining great objectives and implementing them under very difficult conditions.

National Policy on Education – 1986

Two decades later, the Government of India undertook a comprehensive review of the nation’s education policy. The policy statement that emerged following this review reaffirmed: "Education is a unique investment in the present and the future. This cardinal principle is the key to the National Policy on Education."

Higher education, according to the 1986 policy, provides people with an opportunity to reflect on the critical social, economic, cultural, moral and spiritual issues facing humanity. It contributes to national development through dissemination of specialised knowledge and skills. It is, therefore, a crucial factor for survival. Being at the apex of the educational pyramid, it has also a key role in producing teachers for the education system.

The policy urged that in the context of the unprecedented explosion of knowledge, higher education had to become dynamic as never before, constantly entering uncharted areas, and it proposed that the large number of universities and colleges in the country needed all-round improvement and that the main emphasis in the immediate future should be on their consolidation and expansion.

The 1986 policy called for launching the Open University system as an instrument of democratising education and to develop a new pattern of the rural universities to take up the challenges of micro planning at grass-root levels for the transformation of the rural areas. According to Dr. S. Radhakrishnan, democracy depends for its very life on a high standard of general, vocational and professional education.
Recent Trends

There has recently been a new tide of educational thought which aims at drawing from our current experience of all that is quintessential, as also to develop a new vision in the light of the highest traditions of Indian education and of the contemporary needs and aspirations.

The following educational objectives are being emphasised:

- Education aims at liberation — liberation from bondage and ignorance, backwardness and gravitational pulls of the lower human nature;
- Education, being an evolutionary force that enables both the individual and the collectivity to evolve various faculties and to integrate them by the superior intellectual, ethical, aesthetic and spiritual powers, should aim at developing a new type of humanity highly humane, cultured and integrated.
- Education should be developed as a harmonising force, which tries to relate the individual, environment and cosmos in a total harmony by the purification and cultivation of various domains of outer space and inner space;
- Education should be so designed as to become a powerful carrier of the best of the heritage and it should, therefore, aim at transmitting to the new generations the lessons of the accumulated experiences of the past for further progress in the present and the future.

Considering that the contemporary problems of environment, of conflicts and of asymmetrical relationships need to be resolved as early as possible, the Indian system of education aims at the promotion of the goals of universal peace, harmony and unity, based on the principles of liberty, equality and fraternity. According to Rabindranath Tagore, the highest education is that which does not merely give us information but makes our life in harmony with all existence.
Within the broad canvas of these objectives, the specific objectives of higher education that are evolving are:

- To seek and cultivate new knowledge, to engage vigorously and fearlessly in the pursuit of truth, and to interpret all knowledge and beliefs in the light of new things and discoveries;
- To provide the right kind of work ethos, professional expertise and leadership in all walks of life;
- To strive and promote quality and social justice;
- To foster among teachers and students and, through them in society generally, integral development of values inherent in physical, emotional, rational, aesthetic, ethical and spiritual education; and
- To promote synthesis of knowledge, with special emphasis on unity of scientific and spiritual pursuits that would revitalise our country's heritage and promote the ideal of the whole world as one united family.

India has had a long tradition of inquiry and articulation of concepts of universe, self, role of state, economy, social order and other related matters. The methodologies adopted were subjective and objective and included observation, conceptualisation, verification, articulation and teaching.

As a result, India had gone further in science than any other country before the modern era especially in mathematics, astronomy and chemistry, metallurgy and physics. Indian scientists discovered and formulated and anticipated by force of reasoning or experiment some of the scientific ideas and discoveries that Europe arrived at much later. Ancient India was well equipped in surgery and its system of medicine survives to this day. A vast literature is also available on "Vriksha Ayurveda" (Herbal Medicine). In literature, in philosophy and in systems of yogic knowledge not only ancient India but medieval and modern India reached highest levels of achievement. The higher education system flourished in ancient India well; and it continued to influence developments during its subsequent ages, in
spite of diverse forms that developed under the impact of changes in religion, and in social, economic and political life.

**Beginnings of Modern Higher Education**

The modern higher education system is only 140 years old, when the first three universities were set up in 1857 under the British Rule. Policy guidelines given by Macaulay and Wood's Despatch (1854) shaped the scope and the role of universities in India. To begin with, colleges set up in India were affiliated to British universities. In 1857, for the first time, universities were set up in India. Colleges existing at that time got affiliated to these universities.

The period 1857 to 1947 was the period of slow development of institutions of higher education in India. They were set up mostly in administrative headquarters and port towns. They provided education in literature, history, philosophy, political science, social science and natural sciences. The thrust of development was mainly on liberal arts education. Science education occupied a very small proportion. The rate of development was slow as in a period of 90 years only 18 universities were set up in the country. Most of these followed the model of the three leading universities at Bombay, Calcutta and Madras. Along with liberal arts, some engineering and medical colleges were also set up. Most of the colleges imparted education as formulated by the universities. The universities also acted as examining and degree granting bodies. The initiative in the hands of college teachers in terms of curriculum development was, therefore, very much limited.

The guiding principles of colonial rulers were slightly modified by Indian scholars who desired to blend Indian culture with western thought. They felt this would make Indians appreciate knowledge both from Indian as well as from the British point of view. These two philosophical approaches simultaneously operated during the colonial period.
But the development that followed was greatly influenced by Macaulay's Minutes, which had crippling effects, and even till today those effects continue to obstruct the process of major reforms that are now felt to be urgent and imperative.

During this colonial period, particularly after 1906, the desire for a national system of education and need for imparting knowledge of India's philosophy, art and literature also gained momentum. Some of the leading persons attempted to establish indigenous educational institutions with the support of the community. A National College established by nationalist leaders in 1906 at Calcutta was under the principalship of Sri Aurobindo, and some other institutions too came to be established, such as Viswa Bharati by the great poet Rabindra Nath Tagore.

**Development after Independence**

After independence, India adopted the approach of planned development of the country. The First Five Year Plan focused on agriculture, the Second Five Year Plan on industry and the Third Five Year Plan again attempted to focus on agriculture and agro-based industry for the development of the country. This approach for development called for development of the education system in the subsequent Five Year Plans, to meet the challenges of development and the needs of agriculture, industry and society in general.

At Independence in 1947, India inherited a system of higher education that was not only small but also characterized by the persistence of large intra/inter-regional imbalances. Determined efforts were made to build a network of universities, and their affiliated colleges that provided tremendous outreach to a country of vast diversities in language as also in the prevailing standards of education at the lower levels. The feeder schools differentially impacted on the higher education system leading to significant qualitative imbalances within it.

When India became independent, it had only 20 universities and 500 colleges located in different parts of the country. It enrolled around a hundred thousand students in higher education. Participation of women was limited and those who...
graduated annually were no more than a couple of dozens or so. The policies and aspirations of people influenced the development in the following decades.

In the post-independence period, higher education has expanded fast, and it is mostly public in nature. Today, India ranks very high in terms of the size of the network of higher education institutions, with 6.75 million students enrolled. The teaching force numbers about 321,000. Student enrolment increased from 263,000 to 6,755,000 by 1996-97. It grew at an estimated rate of 7 per cent between 1987 and 1993 but has now declined to 5.5 per cent compound rate of growth, with 14 states (out of 23 States and 1 Union Territory in India which have Universities) having a lower rate. In spite of this phenomenal growth, the total enrolment, however, forms only about six percent of the relevant age-group (17-23) population.

The number of students per 100,000 population has increased significantly since independence. It was only 48 per 100,000 in 1951 and increased to 613 per 100,000 in 1997.

India's higher education system compares favorably with the other countries of South Asia and Africa in its enrolment, while our South East Asian neighbors show much higher enrolment such as in the Philippines (27.8%), Thailand (19.0%), and Malaysia (10.1%). Hence, in spite of the rapid expansion of the system in 50 years, access to higher education still remains an issue as the pressure of India's very youthful population continues to bear on it.

With this scientific and technical manpower India has the potential to become the largest reservoir in the world. Compared to the situation that the country inherited from the colonial rulers about half a century ago, these numbers mark a phenomenal expansion of the system.
Institutions 1950-51 1990-91 1996-97
Universities 30 117 214
Colleges 750 7346 9703
Enrolment('000s) 263 4925 6755
Teachers('000s) 24.0 272.7 321

Note: *includes institutions deemed to be universities, but excludes other institutions.


The number of women’s colleges has recorded a substantial increase from 780 in 1986-87 to 1195 in 1996-97. Of the total enrolment, women’s enrolment accounts for 34 per cent.

There is a system of National Level Eligibility Test for appointment of teachers in the system. Some States also conduct State Level Tests for appointment of teachers in their States. Positions of Professors and Readers in the Universities are filled through open selection. Under the Career Advancement Scheme, teachers are also promoted to higher positions up to Professors in the Universities and up to Readers in the Colleges. Out of the total number of teachers in higher education, Professors and Readers account for 12.8 and 26.2 per cent respectively, in the University Departments and University Colleges. In the affiliated colleges there are 13.9 per cent senior teachers and 81.7 per cent lecturers. There were 21 students for one teacher in 1996-97 as compared to 12 students per teacher in 1965-66.

As a system expands, it absorbs a population of students who come from a wide spectrum of socio-economic groups. The "massification of education" has occurred in India at the lower levels of education that feed into higher education.
The quality of that education impacts on higher education. Inevitably, therefore, the higher education system has to cope with the problems of a very diversified student body from first generation learners to those from professional and higher income families whose children are exposed to many other opportunities besides education. The first generation learners have mostly attended the public funded schools with far poor preparation than the latter that patronise the private institutions. Increasing access and decrease in quality have been major issues confronting higher education with a very large young population and increasing strain in government resources.

Education can have a great role to play in decreasing social disparities between groups and in promoting social mobility. For instance, the tremendous expansion of the middle class in India can be confidently attributed to the investment in education, especially in higher education. In this respect, the Indian ethos is echoed now in the Delors Report.

There is a need to place greater emphasis on enrolment of students from underprivileged backgrounds such as the rural areas, the scheduled castes and tribes and other backward groups, minorities, the disabled and others who have suffered from discrimination which has existed for centuries. Hence, special attention has to be given to all these groups through various strategies to be adopted in the university system, especially for access to the system, retention in the system and qualitative development of performance.

The Present Status

There are today, 214 universities and equivalent institutions. The total numbers of universities include six open universities—one central university and five state universities—all run by the government. They also include four universities exclusively meant for women, while all other institutions are open to both males and females. There is no university exclusively for males. Similarly, there are nearly a thousand colleges in the country that give admission exclusively to women students. In addition to providing most of the courses available in other
institutions, these colleges and universities provide a few additional courses that are of special interest to women.

Apart from degree awarding university level institutions, there are 9,703 colleges that provide mostly bachelors and some times master's level education. A majority of the colleges are arts, science and commerce colleges, and offering education in humanities, natural sciences, arts and commerce. There are about 550 engineering and technical colleges, 655 medical colleges, nearly 600 management institutions, 700 teacher education/training colleges and 1100 polytechnics. While many universities in India provide general as well as professional education, there are some universities which exclusively provide professional education, and some exclusively general.

Most of the higher education institutions in India are public institutions. There are no private universities so far, though efforts have been initiated to allow opening of private universities. There are, however, a large number of private colleges. A majority of the private colleges are financially supported by the State. The rapid growth of self-financing private colleges is a recent phenomenon.

**Financing of Higher Education**

Demand for higher educated manpower will increase substantially in the near future and this will impel central focus on the quality and quantity of manpower produced by the higher education system. Both for quantitative expansion and improvement in quality, the system requires large additional resources.

Increasing needs stemming from population growth, need for modernisation and the limited nature of resources, are problems facing financing of education.
The Government of India in the National Policy on Education, 1968, explicitly adopted the concept of 'investment in education'. Keeping in view the growing requirements of the education system, the Government of India has promised to allocate at least six per cent of national income to education from the public exchequer. The end of the ninth Five Year Plan sets this goal for realisation.

Besides its social and cultural dimensions, education is also an economic and political investment yielding long-term benefits. It is, therefore, not only justifiable but desirable to raise money from private sources in order to ease pressure on public spending. This, of course, is not meant to release the state from its financial commitments, which have been substantial in India.

**Growth in Expenditure on Higher Education**

Higher education in India is in financial stress. However, it should be noted that huge investments have been made in higher education in independent India. Total expenditure on higher education has increased remarkably during the post-independence period. At the inception of planning in the country (1950-51), India was spending Rs. 172 million on higher education. Government expenditure alone was of the order of Rs. 42,035 million in 1996-97, and it has risen further during the subsequent period. This impressive growth is, however, considerably offset by increase in prices, and increase in population, more particularly student numbers in higher education. Inflation has had an adverse effect on education. Nevertheless, on the whole, the trends suggest that higher education had a good start during the 1950s (with real growth of 7.5 per cent per annum), and had its golden days during the 1960s, with the real expenditure increasing at an annual rate of growth of 11 per cent; but it suffered significantly during the 1970s, with the rate of growth coming down to a meager 3.4 per cent as educational planners aimed at consolidation of higher education instead of its rapid expansion; and showed some tendencies to recover during the 1980s. Though the growth in expenditure on higher education has been erratic during the 1980s, it had
increased on the whole at a rate of growth of 7.3 per cent per annum. The 1990s heralded an era of austerity and higher education suffered greatly.

Share of Higher Education

The relative priority accorded to higher education can be measured in terms of the share of higher education in GNP. Starting from a very low figure of 0.19 per cent of GNP invested in higher education in 1950-51, the share of higher education increased five-fold by 1980-81; but it came down to nearly one per cent of GNP after three decades of development. But ever since, allocation of resources has been steadily coming down: it tended to decline to 0.4 per cent of GNP by mid 1990s.

India has adopted Five Year Plans as an important development strategy since 1950. The Five Year Plans set new directions for development—quantitative expansion, improvement in quality and relating to several other dimensions of education development—and represent the serious intention of the planners to further develop the system.

The share of higher education doubled in the total education outlay from 9 per cent in the first Five Year Plan to 18 per cent in the second Five Year Plan, and increased to an all time peak of 25 per cent in the fourth Five Year Plan, and ever since it has been consistently declining, and was about 15 per cent in the seventh Five Year Plan. The share of higher education in the total education outlay in the eighth Five Year Plan was estimated to be 8 percent.

In case of education, including higher education, plan expenditures are of relatively small size and huge amounts are incurred as 'non-plan expenditures', i.e., for the maintenance of the gigantic system, recognised as the second largest system in the world.
In the total expenditure on education, the share of higher education was less than one-fifth in 1950-51, it increased to about a quarter by 1955-56, and became stable around one-fourth, suggesting that the relative importance given to higher education in the total education system remained unchanged since the beginning of the second Five Year Plan up to the sixth Five Year Plan, though there had been marginal increases during this period. But the situation has changed considerably from the seventh Five Year Plan onwards.

Devaluation, and the accompanying price rise, has led to an enormous increase in prices of books and journals; and as a result, many universities have had to inflict very serious cuts on their library budgets.

Sources of Funds

The various sources of finances for higher education in India are: (a) government sector — central government, and state government; and (b) non-governmental sector— students/parents (or families), e.g., fees, and other maintenance expenditure, and the rest of the community at large, e.g., donations and endowments.

The relative shares of various sources in 'total' expenditure on higher education in India have changed considerably over the years. The share of the government has increased in financing higher education, and correspondingly that of every other source, viz., student fees, community contributions, and other internal sources declined steeply, though in absolute money terms there has been a significant increase in the contribution of these sources as well. The share of government (central and state) increased from 49 per cent in 1950-51 to 76 percent in 1986-87. And the share of the non-governmental sector declined remarkably. Students' contributions in the form of fees used to form more than one-third of the total until the beginning of the 1960s; its relative share declined to less than half of what it was in 1950-51. The share of "other" sources (including voluntary donations, endowments, etc.) also declined, though the
decline is not as sharp as the decline in the share of the fees. Non-governmental
finances (fees and others) accounted for one-fourth of the total.

Thus, higher education in India is characterised by massive public investment,
though the investment is still regarded as much below optimum. Such a rapid
growth in public financing of higher education in India has been necessary for the
following reasons:

- Facilities for higher education available at the time of independence were
  insignificant. Independence had created an abnormal increase in the
  social demand for higher education, and public expenditure had to cope
  with the demand.
- Building up a new socio-economic system after the end of the colonial rule
  required large-scale manpower with varied skills; so the government had
  to expand investment in higher education.
- The very development models emphasised high skilled labour force, and
  building up of huge social infrastructure for excellence in science and
  technology, and research and development.
- Government policies towards equality in education led to the growth in
  public investment in education, since it involves huge subsidies at all
  levels of education to a substantial number of students, belonging to
  weaker sections.
- The rapid growth of school education naturally pushed the demand for
  higher education.

Recently, efforts are being made to mobilise resources, and it has been
recommended that while the government should make a firm commitment of
funding higher education, colleges and universities should also make efforts to
raise their own resources.
Current Policy Issues in Financing

Generally it is felt that the fees for higher education in India are very low and that there exists much scope for increase in the fee and for rationalisation of the fee structure. This is more so in the case of higher technical education. The UGC and AICTE Committees recommended that at least 20 per cent of the recurring expenditure per student has to be generated through student fees (and other sources).

Student loan programme has been one of the most prominent methods that is currently suggested as an effective solution to the problem of financing higher education. This is also advocated as an effective antidote to check the regressive effects of increase in fees. Many nationalised banks in India have begun to offer a variety of loans to students for higher education within the country and abroad.

An idea has been mooted to levy an educational cess on industries and other organisations that use technical manpower.

Efficiency and Economy in Expenditure

Several measures are being suggested for efficient utilisation of resources in educational institutions and to effect economy in expenditures, including the one related to the consolidation of uneconomic institutions. For effective utilisation of available resources, it is necessary that an optimum size of the institutions is worked out. Institutions with small size would be uneconomic and in the institutions with large student numbers, the resources might be over-optimally utilised. The AICTE felt that institutions of technical education should have enrolments in the range of 1,500-2,000, with a minimum annual intake of 180, and with an intake of 40-60 for every course/discipline. The Committee has also suggested staff-student ratios to vary between 1:15 and 1:20. Available data on some engineering institutions show that more than half the institutions were having enrolment below 1,500, and more than 80 per cent of the institutions have
a staff-student ratio of less than 1:15. All this suggests the need for consolidation of technical education institutions, through proper institutional planning.

Privatisation of Higher Education

The new trends of thinking and overall constraint in resources call for private initiative and community support. In the Indian mixed economy, while the contribution of private sector has been significant in general, its contribution to higher education has not been encouraging.

Whereas there is no formal private university in India, there are a large number of private colleges in the general and technical education spheres. Private colleges that form about three-fourths of the total number of colleges, are of two types: privately managed but publicly funded colleges familiarly known as (government) "aided" colleges, and privately managed and funded colleges, known as "unaided" colleges. A substantial number of private colleges belong to the former category, and they receive government aid to meet almost the whole recurrent expenditure. The private aided colleges have not contributed significantly to easing the financial burden of the government, as more than 95 per cent of the recurring expenditure, and sometimes even the capital expenditure, is met by public exchequer. Hence strictly from the point of view of finances, such private colleges do not have any significant role.

Pure or "unaided" private colleges do provide financial relief to the government in providing higher education, but at huge and long-term economic and non-economic cost to the society. Such institutions have been really a recent phenomenon. They are the result of private enterprise and initiative. In the very recent period, growth of private engineering and medical colleges has been remarkable. They charge donations and capitation fees. While other colleges are, by definition, non-profit institutions, many of these institutions not merely cover their costs, but also make profits, which are not necessarily re-invested in education. The government wants to encourage private initiatives in higher education but not commercialisation.
Measures for Financial Self-Reliance

Now-a-days with declining or stagnant budgets for education, specifically for higher education, institutions of higher education increasingly feel the need to become financially self-reliant by generating resources not only through increase in fees, but also through other measures, such as augmentation of resources from corporate sector in the form of donations and other similar contributions, by forging effective relationships with industry. The government has already promised incentives both to the institutions and to the individual donors. The institutions that generate such resources are promised matching grants by the government, besides stating that such resources would not be taken into account in giving bulk/maintenance grants. The donors are offered fiscal incentives in income tax savings (tax deduction at the rate of 125 per cent of the contributions to professional institutions and 100 per cent to other institutions of education).

It is, however, recognised that none of these measures for mobilisation of additional resources should aim at reducing the demand for higher education.

New Challenges

India recognises that the new global scenario poses unprecedented challenges for the higher education system. The University Grants Commission has appropriately stated that a whole range of skills will be demanded from the graduates of humanities, social sciences, natural sciences and commerce, as well as from the various professional disciplines such as agriculture, law, management, medicine or engineering.

India can no longer continue the model of general education as it has been persisting in for the large bulk of the student population. Rather, it requires a major investment to make human resource productive by coupling the older general disciplines of humanities, social sciences, natural sciences and commerce to their applications in the new economy and having adequate field
based experience to enhance knowledge with skills and develop appropriate attitudes.

Responding to these emerging needs, the UGC stated: "The university has a crucial role to play in promoting social change. It must make an impact on the community if it is to retain its legitimacy and gain public support". It seeks to do so by a new emphasis on community based programmes and work on social issues.

Concepts of access, equity, relevance and quality can be operationalised only if the system is both effective and efficient. Hence, the management of higher education and the total networking of the system for effective management has become an important issue. The shift can occur only through a systemic approach to change as also the development of its human resource, and networking the system through information and communication technology.

The decline in public funding in the last two plan periods has resulted in serious effects on standards due to increasing costs on non-salary items and emoluments of staff, on the one hand, and declining resources, on the other. Effective measures will have to be adopted to mobilize resources for higher education. There is also a need to relate the fee structure to the student's capacity to pay for the cost, so that, students at lower economic levels can be given highly subsidised and fully subsidised education.

The Ninth Plan policy imperatives will focus on (a) access and equity; (b) relevance and quality of education; (c) universities and social change; (d) the delivery systems, the institutional and organisational structures and management; and (e) funding which constitutes the necessary resource underpinning for development.

Emphasis has to be laid on curriculum change; interdisciplinary courses gradually replacing discipline oriented learning, especially at the master's degree level; greater emphasis on field based learning experiences for students both in
undergraduate and postgraduate programmes; more career oriented courses and response to local needs for human resource in specific work-related opportunities.

The university is required to be seen not only as a seat of learning and new knowledge through its research and extension functions but also as a focal point for the dissemination of information to the community through continuing education, extension education and through field outreach activities. It will have a major role to play in directly impacting on the community for social development and change. It should be facilitated in this task that is described by the UGC as the third dimension of education.

As universities abandon their isolationist existence and increasingly interact with other segments of society, there is a need for them to adopt a more professional management. This includes opting for a new type of leadership capable of interfacing with user and other groups in society, and at the same time, capable of providing academic and administrative leadership within a decentralised system of administration, and making increased use of information technology.

The above implies that there will be greater interaction with the user community of both employers and the public to create relevant programmes, to develop greater autonomy in a decentralised structure and to develop a professional management system which has autonomy as well as accountability, and maximising the use of information technology for both effective and efficient management.

As a very small proportion of the relevant age group (around 6 per cent) is enrolled in higher education in India, compared to the developed countries (about 40%) with which the country is going to engage itself in the international market, efforts need to be directed towards raising the enrolment in higher education sector and meeting the increasing costs of such enrolment.
Access means costs but access cannot be overlooked when the base is narrow, not in absolute numbers but in the percentage of the educated in the country's structure. We have to acknowledge the need to prepare a human resource capable of accepting the challenges of the new millennium.

We also have to realise that people could only bring about social changes and transformation and not through technology alone which itself is a product of human endeavour. Hence, human resource development, at all levels, needs to be given priority and made a part of the nation's overall strategy.

**Greater Investment**

Financial strain in the educational sector imposes several difficult tasks not only relating to fee structure and new partnership of education with industry and various income and profit generating sectors but also to the cost-effective designs of structures and methodologies of education that can cater to the needs of massive programmes of education as also to those of intensive education that aims at individual perfection. The advances in communication technology, especially the satellite based teleconferencing, have made it possible to use distance education for training skills in virtual classrooms. It is expected that technology, rightly designed for developing deeper and higher dimensions of personality, will at once bring down the costs and increase the efficiency of the educational system.

Maguire (2000), while speaking in the 5th European conference on higher agricultural education in UK suggested that agricultural education should lead to rural development and food security. He was of the view that the rural development was complex process that demanded sustainable production in agriculture, natural resource management, institutions, infrastructure, health, education, markets, finance, policy in order to succeed.
Mr. Maguire further opined that the agricultural education system could be a mix of formal (college and university) and informal education (adult education programme, farmers group education) for the real development of rural areas of any country.

The dawn of 21st century is the right time to take initiatives for making practical changes in agricultural sector and that needs financial investments in balanced form.

Edweard-Jones (1994) were in favour of research and educational programmes related to natural resource management for economic development. These programmes recognized the necessary reactions between soil, plant, animal, climatic and socioeconomic system. According to them, researchers and educators have an upheaval task before them in the time to come to make the spare of investment in agriculture. The international food policy research institutes have identified three areas for action, namely food security and nutrition, poverty alleviation and economic growth, and the human resources development. These areas can be taken care of while looking for investments in agricultural education (IFPRI 1995).

According to Bins Wanger (1993) there is cause and effect relationship between various factors of growth and investment in agricultural education.

Saguiguit (1987) has emphasized the role of higher education in agriculture in providing pre-service training for professional agriculturists. Agricultural education institutions in South East Asian and the Pacific countries may be adequate in some countries, yet in others named in the UNESCO report, such as Bangladesh, Nepal, Papua New Guinea and Sri Lanka, the number of institutions, and the quality of graduates are inadequate for the future development needs of their countries.
As long as education and agriculture are focused on the present agrarian structure, it will in the best case to generate a two tier system whereby the privileged or upper tier produce an ever increasing surplus while those on the lower tier, comprising the bulk of the rural people, remain bound in agricultural stagnation with a declining standard of living. It is here that the need arises for structural reform and, more specifically, for land reform. Its link with economic development is obvious since only the correction of the agrarian structure can make possible a depth effect of agricultural education and extension and open up the remote villages for the application of advanced agricultural methods Jacoby (1971).

In most, if not all, of the newly developing countries, agricultural education and research are lagging. Often a lag is greater than can be justified by the level of economy and the general stage of development of the nation involved. This results from long entrenched mores and cultural backgrounds with their influence and attitudes towards social responsibility, education, research, and technology. Peterson and Frazier (1964).

The Green Revolution provided a major stimulus to agricultural research with spin-offs to agricultural education. High-yielding seed varieties combined with other inputs such as water and fertilizer created a demand for rising levels of knowledge and skills (Rosenzweig, 1995). A University of Florida (1995) report traces the establishment of agricultural universities to the beginning of the first Green Revolution. It lists the State Agricultural Universities of India, the University of the Philippines at Los Banos and Kasetsart University in Thailand among other successful institutions. However, the success in establishing these institutions and in their rapid development and accomplishments through the last 30 years must now be compared with current status of operation. Some case studies of agricultural universities in LDCs are presented below.

India: Busch (1988) relates the development of today's 28 State Agricultural Universities (SAUs) and the assistance received from the USA from 1952 to
1972. He credits the SAUs with significant achievements in education, research and extension and in producing one of the largest systems of agricultural universities of the world with a capacity to train students to Ph.D. level. Factors contributing to this success are listed as:

- Leadership and support from research funding bodies
- State government support
- Demand for agricultural graduates
- The agrarian structure of India
- USAID, universities, World Bank and UNDP support
- Continuity and commitment of SAU leaders
- A pool of high quality students
- An openness to internal and external evaluation

Easter et al (1989) similarly note the strength of Indian SAUs while acknowledging some drawbacks in these services to the most important industry for India. Jawaharlal Nehru has emphasized the importance of agriculture to India in 1959, "however much we in India may progress in the domain of science and industry, as undoubtedly we will, the basic fact remains that agriculture is of primary significance to our country and to the world". Nevertheless, a recent World Bank (1995c) report concerning agricultural human resource development in India found that SAUs lacked a culture in which students are the prime reason for their existence, and that management has failed to demonstrate skills in planning and evaluation. Academic in breeding and general academic isolation are said to be contributing to a continuing decline in academic standards through a retention of outdated teaching methods, curricula and physical facilities. Funding for education failed to achieve balance with research funding to the detriment of teaching programs. Cultural problems such as seniority overriding capability has impacted on academic administration and compounded management and education concerns.
These constraints are operating in a scenario in which the employability of graduates has declined as a result of the public sector reducing the numbers of new graduates. It absorbs and the need for revisions in curricula to cater for different markets for graduates. Ryan (1993) had observed similar issues and recommended significant revisions in the fields of management, academic, administration, curricular and international interaction. Progress is evident.

China: China's agricultural knowledge system is extremely large, institutionally complex and covers a wide range of agro ecological zones and market systems. Coupled with this size and diversity is the rapid pace of institutional and economic change occurring in China and the associated imbalances in funding between public and private sector agencies towards which many qualified research and education staff drift. International assistance to the Chinese agricultural knowledge system has been too recent to form comparisons with those of other countries to which such assistance has been directed over the past four decades. Nevertheless, the review by Fan and Pardey (1995) provides interesting descriptive information concerning institutional and policy options.

The organizational structure of the Chinese agricultural system separates agriculture, forestry, research, and university functions. Separation is perpetuated at provincial level with provincial research institutes and agricultural or forestry education institutions having no direct linkages to national level universities or research bodies. The extension and related activities conducted at prefecture level are similarly separated from the institutions of the provinces. Past linkages between provincial research institutes and the Chinese Academy of Agricultural Sciences have broken down since the Cultural Revolution and interaction today is based on collaborative programs, leadership of which is usually vested in national centers. Applied and adaptive research conducted at prefecture level is significant and a trend of increased collaboration between provincial and national programs is an important means of coordinating research.
The agricultural university system of China was adapted from that of the Soviet Union in the early 1950s. This system separated agricultural universities and colleges from comprehensive universities with a low emphasis on research in agricultural universities. This has been rectified progressively in recent years in China. The seven key agricultural universities of China administered by the Ministry of Agriculture emphasize research to a greater extent than provincial agricultural colleges that focus primarily on applied research and extension. The major role of both universities and colleges is the training of personnel as is indicated by the estimate of Fan and Pardey (1995) that only 22 per cent of scientific and technical staff at universities in 1986 were classified as full-time-equivalent researchers. They found that the lack of research resources in universities and colleges affected the quality of training received by students. While the imperative within China remains that of increasing food and fiber production, there are indications of agriculture being conceived within an environmental context among informed advisers.

Agricultural education was confined to a single school of agriculture providing a two-year vocational course. Its medium of instruction was English, which was not the language of the farmers in Ceylon. There was no organization for training farmers. In the late 1950s, practical farm schools were opened, with instruction in the national languages, but few trainees from these schools went back to farming. In recent years, some of them have been settled in special projects within the colonization schemes, where it is expected that their high management capability could be combined better with adequate land and capital resources. In-service training of extension workers has been carried out only at irregular intervals. With aid from the FAO, attempts have been made recently to set up regular training schemes for all extension officers (Andarawewa, 1971).
Future Agricultural VET

In reviewing literature concerning VET and agricultural VET in particular, one might well ask whether it has a long term future as it is currently conceived and implemented. The issues include such points as those included VET Heal Thyself! Major issues, it could be argued, may be addressed through industry-based in-service training on one hand, and supplemented self-help schemes for short technology-oriented training on the other. However, a significant infrastructure in the form of existing colleges and schools, trained teachers and societal expectation works against any such proposal. Perhaps the over-riding conclusion is the need for a balance of approaches to VET to work in parallel and in conjunction with each other to minimize the impact of inherent system weaknesses.

A World Bank (1991) policy paper isolates the following areas for future action in the VET sector on the following:

- Encouragement of employer training
- Creation of responsive policy environments
- Reducing regulation of private providers
- Improving the effectiveness and efficiency
- Assessment of appropriate training objectives
- Improved market orientation in planning
- Improved institutional responsiveness to market forces
- Using expensive training resources efficiently
- Building capacity for policy implementation
- Diversifying sources of finance

These issues are being addressed in developing a national strategy for agricultural colleges in Thailand (DOVE, 1999). The approach being taken in that case is oriented to the needs of employers and students in determining the allocation of resources and the educational product it. It recognizes that a totally market-demand driven system has less relevance to agricultural VET than to
industrial VET, yet embodies the important aspect of a philosophical commitment to orient activities to required outcomes. Employers of agricultural VET colleges expect graduates to be skilled workers and technicians [who] can work independently with a minimum of supervision, who are practically oriented, interested in agriculture, trainable and capable of quickly adopting new skills, with the right work attitudes and social communications skills. This was not seen to be deliverable from colleges operating in relative isolation from employers or from staff who had retreated behind college walls.

With agricultural VET colleges in most of Thailand's 75 provinces, the relevance of a nationally controlled system and curriculum is being questioned and consideration given to local industry-based Advisory or Executive Boards. Increased financial autonomy, reorganization of lines of authority within colleges and within the national college coordination system are seen as pre-conditions to addressing specific educational issues including quality assurance. The need for national policy makers to take an interest in reorienting the agricultural VET system is noted to be a pre-condition to a successful outcome.

From a broader natural resource management perspective, the outcomes of the FAO (1995) Electronic Conference concerning working with farmers in partnership while strengthening training provides indications for training for Natural Resource Management.

In considering the role of VET in natural resource management education, agricultural training must be designed within appropriate resource management principles. The original purpose of VET remains valid, viz. the training of technically able persons to work in areas of agricultural production, environmental protection and management. If, as argued elsewhere, agricultural higher education will progressively shift to a broader natural resource management education context, agricultural VET may be seen within the broader agricultural education shift. In that circumstance, one might expect agricultural VET to include a wider range of natural resource management principles and
techniques. For example, plowing of fields would acknowledge techniques conducive to minimal tillage, minimal use of weedicides, low potential for erosion, and protection of high risk and environmentally important areas. Discussions concerning VET have not ventured far along this path. Nevertheless, it appears that agricultural VET is poised for a period of change in the light of funding imperatives, and the general trend of allocating government services and funding to industries. The opportunity to expand agricultural VET to incorporate skills and techniques of environmental protection and management is now before us. The retention of government responsibility, at least for such public good elements, needs to be emphasized.

Education and training for natural resource management in LDCs builds strongly, both in terms of logic and responsibility, on existing agricultural higher education and VET. Insofar as agricultural education approaches in LDCs have borrowed heavily from MDCs, some further comment on the origins, and current and expected future trends for natural resource management education in the MDCs is warranted. This forms the substance of the following Chapter

**Education Skills**

You think we want only technical skills, for employment as of old, in factories and mills; While suited to some who seek such tether, it is not suitable for all, or forever.

With new interests, new knowledge develops, further learning more than retraining envelops, a context for specialties must provide, Education, training - one not the other deride.

As the doctor requires sound skills to act, mixed with knowledge, learning and access to fact, So in fields of agriculture, we yearn, We need more, please don't deny us the right to learn.
We work in farm and laboratory, in regulation and other such tasks advisory, which require knowledge for learning clients. We need more than rote-skills, we can't be compliant.

That invisible barrier break down, Let enlightened action illuminate the gown, No longer binding us to this one caste, Training to education as one, thus bound fast.

In terms of agricultural projects, some 469 projects financed various aspects of education, research, extension, training and project management, although only about 25 per cent of these made significant acknowledgment of universities. The total World Bank input to agricultural higher education over this period is estimated to have been about US$700 million compared to total inputs for support services of around US$5 billion (World Bank, 1992). When it is considered that these sums span some 25 to 30 countries over a 26-year period, an annual average input per country of around US$1 million, is a very low level of development investment. This is particularly so when one considers that such projects would have been conducted in countries with significant agricultural bases where agriculture could act as the engine of economic growth (Figure 3.1). Inputs by other lenders and donors (USAID is the largest of the bi-lateral agencies, assisting 70 institutions in 40 countries) may be expected to double these figures at best.

IIPS 1995, National Family Health Survey, 1992 – 93 indicates that the relation between the education and social outcome are much stronger than the knowledge of the relation between education and economic outcomes. Hence a Labor market effect of education is urgently needed.

A Model Agricultural Universities Act stipulates the governance and methods of imparting agricultural education.