

OPERATIONALISATION OF SATELLITE REMOTE SENSING - MANPOWER REQUIREMENTS

T.V. Pavate
Chief Project Engineer
Centre of Studies in Resources Engineering
Indian Institute of Technology
Bombay 400076 - India
Commission Number VI

INTRODUCTION:

Remote Sensing has assumed a new dimension with satellites picking up information from the ground and transmitting the same to ground receiving stations giving details on the regional basis regarding resources such as Water, Forestry, Minerals and Agriculture. The repetitive data which is being received both in the form of images and in the form of computer compatible tapes has opened a new horizon for computer aided digital analysis of dynamic changes on global basis. In addition to the conventional visual interpretation, the satellite data demands digital techniques for analysis with the use of computer knowledge of advanced techniques of image processing, cartography, map making and data management. Technology transfer and operationalisation of new techniques in various user agencies have focussed the issues mainly concerned with manpower training and requirement and utilisation of immense data which is pouring every day in abundance for the study of natural resources and engineering. An attempt has been made in the present paper to bring out some of the aspects of manpower requirements in the emerging area of satellite remote sensing for operationalisation in user agencies towards overall global welfare and happiness. A developing country such as India needs trained manpower nearly seven to eight thousand scientists and engineers every year in this area for different user organisations. Available facilities, methodologies and new approaches have also been discussed in the paper.

EXISTING FACILITIES AND LIMITATIONS:

Manpower training in emerging areas such as satellite remote sensing needs high level of training and sophisticated infrastructure with computer and image processing facilities. Especially in developing countries, such facilities are available only at universities and higher technological institutes. The inbuilt mechanism of higher institutes of learning demands certain curricula requirements for the entrance to various educational programmes and the process has some hurdles which limits intake of students or inservice personnel for courses to a very small number. Normal period of post graduate course requires one and half years to two years for completion. Unfortunately only a few universities and institutes in India are imparting emerging area of satellite technology, remote sensing and applications at advanced level.

Space technology has developed to a great extent in all its facets since 1957 when SPUTNIK was put in orbit. However precious little has been done in educational curricula for introducing suitable course content at undergraduate level in all science and engineering courses. Only hand picked physicists and some engineers and scientists are pursuing the advances of space technology and some of its spinoffs including remote sensing and applications. If developing countries desire to keep pace with the advancements in this emerging area and to reap the benefits for human excellence, then the present educational system has to introduce many changes and novelties. In order to meet the immediate and urgent needs of operationalisation, new methods such as nonformal training and concept of advanced centres should be explored.

NONFORMAL TRAINING AND ADVANCED CENTRES FOR RESEARCH, DEVELOPMENT AND TRAINING:

Keeping in view, the requirement of manpower for operationalisation of emerging area of satellite remote sensing in various user agencies nonformal training would go a long way in increasing the number of trained manpower. Such nonformal training programmes can be incorporated in advanced centres of research and development in the area of space technology and remote sensing. Advanced centres in the area of satellite remote sensing can be independently established at various places or can be located in the environment of higher technological institutes. This arrangement will facilitate the centre to take advantages of higher educational environment as well as organise courses under nonformal programmes. In such programmes there will be sufficient flexibility for entrance to various courses for trainees coming from different user organisations. Course contents can be formulated as per requirements of trainees. Duration of a training course also depends on the background of trainee officers from different organisations.

TRAINING FACILITIES:

Under nonformal programme, different types of courses are arranged for different durations as follows.

- i) One week duration courses for decision makers and senior executives. Such courses play an important role in propagating the importance of potentialities of satellite remote sensing and its applications to themes such as water resources, mineral resources, forestry, pedology, terrain evaluation, landuse and urban development, such courses will also stress the importance of geodata base and image processing techniques. The course will contain about 15 expert lectures and 3 practical sessions which will focus the potentialities of satellite remote sensing to various themes.

- ii) Two weeks, four weeks, sixteen weeks courses for middle level trainees - series of lectures and practical sessions giving ample practices on digital analysis.

Expert lectures will be arranged by eminent personalities hailing from important institutions within and outside India. In this connection it is desirable to have close link amongst developed and developing countries. The main objective of manpower training for operationalisation is kept in mind. Such courses will be very useful for the working scientists and engineers who would help in horizontal transfer of technology in various user agencies after their training. During medium and long term courses, trainee officers will have independent project works which will be done by using digital techniques.

Use of satellite data demands an integrated approach. Inservice scientists and engineers of different backgrounds - geologists, foresters, civil engineers, agriculture graduates computer engineers, statisticians, all have to be exposed to new techniques. For such an integrated approach the courses need to be always seperately thought of taking into consideration and considering the background and individual group requirements. They will have to be designed and formulated accordingly in the most optimum way. This needs continuous monitoring of requirements of the training programmes. It may be required that the courses have to be arranged at a working place away from the Centre. Under such circumstances, mobile van equipped with all facilities including image processing equipment would go a long way. The van can be taken to places of training and would thus enable the trainees to work on image processing systems at their own environment and place of work.

AUDIO VISUAL PROGRAMMES:

In order to make use of all modern methodologies, it is possible in nonformal education to prepare different modules for seperate groups coming from different user agencies. They can be supplied to them by post or messenger and major portions of expert lectures can be covered by videos and other audio visual cassettes etc. For direct on the spot handling of the satellite data, arrangements can be locally made with the use of well equipped mobile van.

DISTANCE EDUCATION SYSTEM :

In order to increase the number of trained personnel, concept of distance education which involves, broadcasting and television can be explored. This needs natioal organisational set up to handle the different facets of activities connected with broadcasting and televising and preparations of programmes connected with satellite remote sensing and its application to different themes.

CODE OF PRACTICE AND STANDARD SPECIFICATIONS:

Operationalisation involves two aspects i) manpower training ii) successful implementation of new technologies in day to day programmes. Thus for implementation, it is required to change the existing code of practices in user agencies especially in public works department, irrigation, forestry etc.

These organisations need standard specifications at the national level so that uniform practices are introduced in their routine working codes. These codes will also have to be reviewed continuously so as to keep pace with developments especially in satellite remote sensing. The whole concept of slow official routine has to give way for dynamic working model. In view of abundant data flooding almost everyday from satellites, it has become absolutely necessary to adopt geographical data system using satellite data at district, state and national levels. System has to have a national grid inter linking all the units. This arrangement not only will integrate the latest information system but also increase the efficacy and effectiveness of national planning and execution. Thus operationalisation is a an involved process consisting of manpower training, evolving standard specifications and code of practices and formation of geodata base information system. Incidentally, such an operational activity would generate new employment opportunities right from grassroot level to the topmost decision making level.

CONCLUSION:

Considering various aspects of operationalisation of satellite remote sensing keeping in view manpower requirements the following conclusions could be drawn for the consideration and necessary implementation

- i) Nonformal training programmes should be encouraged at various relevant advanced centres all over the country for training of inservice engineers and scientists in the emerging technology of satellite remote sensing
- ii) Concept of well equipped mobile vans should be given thought and pilot studies and implementation may be encouraged
- iii) New teaching aids - audio visual programmes video recordings to be encouraged in the area of propogating the use of potentials of satellite remote sensing and its various applications. An organisation should lookafter the preparation of programmes with the involvement of experts. Advantages of distance education methodologies can also be taken for the programmes for training.
- iv) Decision makers and top executives of various user agencies should take necessary steps to evolve new code of practices and national standard specifications incorporating the usage of satellite remote sensing technologies and

mandatory rules for implementing and regular usage of them in their routine work.

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REFERENCE:

1. Volumes containing lecture notes at various training programmes conducted at CSRE, I.I.T. Bombay during 1981-88
2. Remote Sensing Training and Educational opportunities in India. ISRO Publication May 1987