73

Strategic Planning of Information Technology in Agricultural Universities

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ABSTRACT

The existence of an information management strategy gives long term confidence in the direction of development, cost-effectiveness measured over a long term and stability in infrastructure of the SAU and its operations. The paper views that the delay in achieving the objectives of Agricultural Research Information system Program is the lack of a foolproof IT strategy and argues that in the process of developing information strategy; information component should be well understood if benefits are to be derived from that. It explains information technology and its application in an SAU in the wider issue of information systems and information management which are IT based. The study establishes that in strategy evolving factors which ensure optimal choice of target applications and impact on the choice of successful applications implementation are to be recognized. Hence a framework and an understanding of the scope and aims of the strategic planning exercise by librarians, information scientists and all others who are involved is essential.

1 INTRODUCTON

In agricultural sector a significant development in post independence period was establishment of agricultural universities in the States. The idea of establishing agricultural universities in states was contained in the report of the first Education Commission headed by Dr S Radhakrishnan. The concept of an agricultural university was based on the promise that research, teaching and extension activities should be fully integrated and geared towards the solution of the farmers problem.

There are presently 29 SAUs in different parts of the country. The basic objective of ICAR support to them was to improve agricultural and research standards within each agro-ecological region—as three fourth of India's population has been living in the rural sector and in their economic development lies the development of the country.

Agriculture and related fields also experience developments of an unprecedented speed which results in information explosion. The optimum utilization of the developments and the knowledge so generated necessitates efficient information management that can enable quick and timely availability of required relevant information. Thousands of scientists working under State Agricultural Universities (SAU), Colleges, Regional Agricultural Research Stations, and Krishi Vigyan Kendras under it are engaged in agricultural research and transfer of information and knowledge to the farming community of the State.

2 Importance of IT

Information Technology (IT) is here used as a generic term for convergence of computers, telecommunications, electronics and information/ knowledge organization and retrieval techniques developed in library science and the resulting technologies - is now in many senses of capital importance. There is a sheer size of IT industry and expenditure on IT in the SAU's, traditional universities and other institutes. The high availability of goods and services on the IT market, needs to be addressed as a more central issue in management thinking and work organizations than ever before. Together with rising expenditure trend it also rises ever more urgent questions, including: what are organizations doing with IT, are the equipments and systems acquired satisfy the specific requirements of applications planned, how are we disadvantaged without IT, how can performance and/other competitiveness be improved with library and information science and technologies.

On size of organizational expenditure and on rising trends in the expenditure alone, the financial aspects of IT have become a critical management responsibility and focus for attention in work SAUs and other organizations. IT is of capital importance in a deeper sense. This is its large potential impact on organizations. How IT is applied can have massive implications. Many agricultural research institutes, other universities and organizations in developed countries are already highly dependent on IT. This needs priority attention from those responsible for managing SAU's and other universities and institutes. Information based assets and the capabilities they offer, embodied in people, technology

and/or their combination may well form a core competence in many organizations, producing ways of differentiating the organization in terms of both offering and performance.

Another meaning contained in the phrase of capital importance presents itself. Given the large and rising expenditure on IT and its potential critical importance, clearly the evaluation and control of IT investments becomes a vital management task. There is a more fundamental issue that arises at this point. IT is used hereto refer to the supply of information based technologies. What matters however is how IT becomes translated into Information Systems (IS), that is organizational applications, more, or less IT based delivering on the information needs of the organization and its stake holders. It is the evaluation of IS investments that becomes of capital importance. It is reinforced still further when the evidence on all issues of information management strategy are taken into account.

- there is very wide questioning and uncertainty about whether IT/IS investments are actually paying off. The abandonment of earlier VSAT and equipments which have become obsolete even before they are installed by some institution is an example.
- there is accumulating evidence of difficulties in and also of indifferent IT/IS evaluation practice.
- much management attention: focus on the critical prioritization and feasibility stages of IT/IS projects, even if less attention is paid to subsequent possible evaluation stages and evidence and hence weight is upon getting evaluation at these early stages. Yet there is much evidence showing inappropriate techniques and poor processes being used.

There is a lack of understanding of IT as a major capital asset in SAUs and other organizations. While the annual expenditure on IT may receive detailed attention amongst senior managers as well as IT directors, there is little awareness of the size of the capital asset that has been bought over the years. IT and the information assets underlines is merely seen as a balance sheet item, a fixed asset. Too often like people IT is seen as an expense, and treated as one. If the cost of accumulating such a potential asset were understood, information asset may well be less under managed than they are at present. Clearly, improved evaluation and control again have rules to play here in bringing the critical issue of the cost of this IT/information asset as well as its potential value, to detailed attention of management.

2.1 Situation in Agricultural Universities

Information being the most important resource for development in agriculture also SAUs require efficient information systems. ICAR Research Institutes and other organizations engaged in agricultural education, research and development also require information systems. Hence in 1995 ICAR established Agricultural Research Information System to strengthen the research information base with funds from National Agricultural Research Project. It has two main components, creation of infrastructure for providing electronic connectivity and creation of Management Information System and computerized electronic databases of Indian research findings in various fields of agriculture and allied areas. The ARIS project has provided support to all SAUs for their information system development. These information systems at SAUs are intended to serve the following groups of users.

- Those at managerial level in agricultural research institutes, Vice Chancellors, Deans and Directors of the SAUs, Secretaries of Agriculture and Rural Development Departments etc.
- Scientists working in extension and development departments of the above institutions and
- farmers who require information on input/output prices, market information, location improves varieties, cattle feed, improved techniques and methods etc.

If the SAUs which have received the ICAR support under ARIS for information system development had good Information Technology Strategy and the funds were utilized effectively the information systems at SAUs would have achieved

- a campus network and digital library accessible throughout the campus and also a WAN if it is multi campus institution and had completed at least two years support under ARIS;
- improved research planning supported by the information flow;
- facilities for ensuring the avoidance of duplication of research and extension projects and programmes;
- better coordination and linkages among rural development agencies and banking institutions;
- effective information sharing mechanisms and
- electronic interface among development agents and farmers.

But we can find that none of the SAUs have effectively utilized the funds. Average Support already received by each SAU comes to about

one crore which is more than sufficient for maintaining a 24 hour accessible site with library information and other data about the university. But not even a single SAU has developed such a site that is accessible. Such sites using mainly state government funds and due to the enthusiasm of IT processionals who accidentally happened to be their when managers with good IT awareness were there have come up at one or two agricultural universities but could not be launched due to the interests now playing in utilizing of funds for IT which is French and German to decision makers. As this enables going on spending without achieving any results commissioning any system at optimal cost is a threat. All these points towards the need for an IT strategy in SAUs.

In the State Agricultural University (SAU) formulating a strategy for Information Technology (IT) is essential for the optimum utilization of the resources spent for Information systems as well as the information resources available to it which will in turn result in the effectiveness of the functioning of the university. The importance of strategy formulation for Information Technology can be achieved only when its technological issues are viewed in a wider context of the SAU where they are to be applied. Forming an overall information system management strategy will cover Information Systems (IS) and Information Management (IM) as well as technological strategies all of which are to be considered together.

Preparing an integrated information management strategy brings into consideration. three main issues; information technology, information management and information system. These three aspects together form an integrated strategy on information handling in an SAU. If we examine the above factors in detail, we can understand that their dimensions, their subsystems etc. are not similar. But the management and cultural and organizational dimensions cut across them.

3 Quality of Research

Information Technology's contribution to quality improvement, efficiency and effectiveness of higher education and research is a widely accepted fact. The elements in educational and research system that can be highly influenced by the use of information technology are quality improvement, avoiding repetition, up-to-dateness, cost effectiveness, effective teaching, convenient learning, avoiding loss due to duplication in research, variety of support services, operational feasibility and improved management.

The possibilities offered by IT for transfer of information has now

made learners to question the obsolete methods and outdated contents of courses offered, as well as research projects suggested from above which indirectly affects quality improvement in education and research in agriculture also. Agricultural education and research systems like others are made up of a variety of functional activities. They are library and information service provisions, teaching, research, extension, development, finance, personal policies etc., which are crucial. Ensuring co-ordinated strategies to support these aspects of an SAU is of significance in preserving a healthy academic and research environment over time. Alternative option to academic administrators is to operate on a day to day basis with little strategic support to their decision making. This will result in short termism, which is divisional or localized sub optimal policy and has a risk of failure in long term. An examination of the functioning of our SAUs can show that they lack strategic thinking. SAUs like other universities are also usually administered by political opportunists who are appointed for a very short term, and the staff, students and public has no say until it will be too late. In many SAUs we can see such inefficiency, and loss of investments in IT which have resulted from the failure to plan long term and to appreciate the wider context in which information technology should be managed.

Information technology related strategies are very important requirement in an SAU also; for education and research management policy for the survival in a world in which tons and tons of knowledge products are out every nano second. The need for co-ordinated strategic thinking should pervade in an SAU's administration and should be applied as much as to other domains as to library and information system management and technology. Teaching methods, research projects, library and information services, personnel, finance, and organizational strategy should be developed parallel to IT strategy if there is to be a balanced development. There will be no result oriented system without a strategy. But despite the fact that information and the document holdings of the library form part of the most vulnerable assets of an SAU or agricultural research institution, they are frequently the victims of adhoc planning and piecemeal development rather than being incorporated into strategic thinking. Perhaps with the present concern and enthusiasm in education and research systems for Information Technology; various information systems have been established. INFLIBNET, ERNET, ARIS etc. are founded on a realization that coordination of information, its acquisition, organization, dissemination and utilization are crucial to a university or research system's timely response to developments and changes going on all around and the resultant needs of the society.

Systems like ARIS and INFLIBNET have Management Information System (MIS) as part of them which respond to the senior educational and research administrators to have required management information at their control through an effective mechanism for accessing and coordinating functions across departments and campuses. These MIS also requires to be viewed in the context of a broad integrated information system. MIS can not be set up independent of other departmental information systems.

4 Need for Strategy

The existence of an information management strategy gives long term confidence in the direction of development. It enables support for long-term educational research and development goals and targets. Information management strategy enables cost-effectiveness measured over a long term and stability in infrastructure of the SAU or agricultural research institution and its operations. With a strategy; development is not limited to short term. It goes on as continuing incremental improvement of systems, services and operations built on a secure base and a solid structure.

In the process of developing information strategy; information component should be well understood if benefits are to be derived from that. Otherwise results can be negative. A misdirected information management strategy based on insufficient analytical work lacking realism or narrow in its genesis but too broad in its application, and without involvement of library and information science professionals, can disregard major aspects connected to information segment which is vital, can cause conflicts of interest, confusion and disaster in the long run. An information technology strategy is well developed when the process is linked as should be the outcome with other management strategies of the SAU especially library and information service management strategy which is to form the main component.

Information technology and its application in an SAU is wrapped up in the wider issue of information systems (IS) and information management (IM). IS and IM may be more or less IT based. In strategy evolving we have to recognize and apply our self to a whole range of factors which ensure optimal choice of target applications impact on the choice of successful applications implementation, and provide the chance for the long term realization of the chosen developments. Hence a framework and an understanding of the scope and aims of the strategic planning exercised by librarians, information scientists and all others who are involved is essential.

5 Information Technology Manager

Important issues in information strategy formulation in an SAU are who should form it, when it is to be done and how. Choice of the person who will conduct the formulation exercise is crucial. Many barriers may be imposed on the manager who will be entrusted with research and strategy formulation for information system management. This may be related to his experience and expertise, rank, sphere of influence or accessibility to vital facts or opinions. This can happen even if they are higher level officers next to the Vice Chancellor of SAU or Director of ICAR Institutes. If the task is to be completed successfully it needs to be managed by University Librarian or Director of LIS in universities or Deputy/Asst. Directors of Library, Information and Documentation Divisions in research institutes or some one with a broad range of competence similar to them who have wide access in the University at all levels. In India Nagpur University and some others have accepted this fact and are far ahead of others in IT implementation.

If competent Librarian with good exposure to developments in IT is not present in the system and can not be made available immediately a consultant from outside the organization can be considered though such a person can never be a substitute for the University Librarian or head of library/documentation divisions.

Many unexpected problems can restrict the scope of the strategy in broader context. The reasons can be poor' choice, inability of Librarian or for manager, of terms of reference etc. and lack of understanding at Vice Chancellor/Director level above. The complexity of SAU's or other institute's organizational set up also will be an affecting factor.

6 Components of IMS

There will be bidirectional relationship between Information Technology (IT), Information Management (IM) and Information System (IS) Strategies which are the components of Information Management Strategy. In different SAUs or research institutes different plans will be there. In some decision making will be from top down. i.e. IS to IT. Requirement are intimated to IT managers from above without considering the benefit of the system integration, use of new technologies and development of long term architectures. In a few organizations in India bottom up initiative can be found. Initiative and control of IT development plans are kept to the unit of Library and Information Systems and the higher level is concerned only with budget approaches. A balanced scenario in

which top down initiatives are mixed and combined with technical initiatives, innovation and bottom up service development where a continuous exchange of views takes place is more advisable.

There are many situations where the IT function is fully integrated into the planning process. It can significantly influence the quality of research and education of an SAU as well as its position in the State's development. This may be through the timely availability of information on current research, efficient processing and speedy dissemination made possible by the information system.

The relations between information system and information management components and between information technology and information management components are to do with the issues of absorption of policy directives into the organizational structure, cultural impact and cultural constraints on new systems and the impact on and the impact of management in the SAU. Relation of information system to information management involves consideration of the impact of application systems on organizational topology/management relationships and roles whereas IT and IM interact at the level where Information Technology and Information Technology functional area are itself folded and incorporated into the organization.

6.1 System Strategy (ISS)

Information System (ISS) Strategy describes the relevance of the educational objectives specific to an university, the academic culture, targets, its comparative position among other universities etc. to the development of information systems. It is most closely allied to and should be aligned with institutional strategy. It is influenced by the positioning of the University other universities and institutes in the region with same areas of specialization, etc. and the way in which these aspects are considered by the top management as well as information management. It is formed on the basis of perceived opportunities short and longer term. It should facilitate the connection between political crisis and operational activity. The emphasis in determining information management Strategy is at top most level in University. This top down view should be closely linked to the bottom up analysis and contribution based on presently perceived capabilities and resource availability. Beyond the library and information scientist, information system strategy formulation is not the sole responsibility of the executive nor of the other end. But access to those who determine the direction in which university should move is essential. The executive that may be a group or person

which determine the direction in which university should develop will be forcing upon their political will on the institution. Information systems strategy is associated with the interpretation of political imperatives and transformation of them into operational activity.

6.2 Management Strategy (IMS)

Information Management Strategy (IMS) is concerned with management and staff, operational control activity, organizational structure and planning. It is related to the topology of management, which means relationships, manner and scope of information technology, operational control and the way in which IT affects or will affect the functioning of the SAU. This strategy is not restricted to libraries or IT departments alone, but also applies to way of management procedures, in user departments influenced by IT. In educational and research institutions like an SAU information technology has to be seen as impacting on and fully integrated with the academic and research administration, teaching, learning methods, support services and many functions. Formulating IMS can result in reevaluation of existing departmental and functional responsibilities, organizational set up and procedure's interdepartmental boundaries, channels of communication, nature of work of scientists, teachers and librarians and their responsibilities. IMS can challenge organizational structures, existing methods of control, management responsibilities and departmental protectionism. How, desirable changes can be identified and how they take place, is a matter of planning and management involvement which passes across departmental boundaries and beyond the library and information service or IT department.

6.3 Information Technology Strategy (ITS)

Information Technology Strategy (ITS) will describe the operational imperatives of Information Technology Department. In SAU's IT Departments should be modernized library and information service management units. It will be concerned with the heart of the information and knowledge resources, the engine, and the services or products it generates, and the mechanisms that are behind them. It includes consideration of the communication systems for access and down loading information, digital storage facilities, packages for organizing and managing huge quantum of information, search enquires and normal computing and data processing facilities and application programmers which are essential in all departments. Issues involved in IT strategy formulation are complex.

Here also the exercises has to go beyond an SAU's library boundaries for completeness. Technological in turn, security and the channels of communication with users are all integral parts to be considered.

IT strategy is also deeply concerned with content, its definition, its flows, utilization, value, availability and security. It is strange that the content, its characteristics and usage is so casually considered and handled in most of the SAUs and other universities and research institutes, not to say in so many institutions whose concern itself is IT. Reports generated by Management Information Systems support many executive decisions. These may be operational decisions, decisions on academic and research programmes, development decisions, budget etc. Even though all that may affect an SAU's standing or repute there is frequent evidence of inconsistency in data definition, presentation and storage of this basic resource which underlies and underpins the reporting system that contribute to university's success or failure.

In most of the SAU's there is a tendency to identify IT strategy, with considerations of hardware/software purchase, software development, OS, communication protocols and other technical matters being at forefront of management planning. Some SAUs have formed Directorates of Information Technology for centralizing computer purchase and after that are trying to frame objectives for the directorate to make it stand. They are important but they are only tools of the system.

7 Importance of Strategy Formulation

Study of strategy formulation gives an understanding of the exercise we have to do, a frame work for the application of real and worthwhile analytical techniques that are both top down and bottom up in their approach. They can give a checklist for the practitioner. They can point out the interaction between conventional IT domain and the users that should be studied and managed in the migration process from the system concept through to implementation.

By determining strategy for an IT system, the hardware architecture, the communication facilities, application priorities, data definitions and so on; one is not by that alone presenting a comprehensive strategy for the handling of an SAU's information system. There are many things more than that. There will be an overlap between IT application selection and the need to support SAU's objectives. IT enables marketing of information services as well as the information support promotes the marketing of consultancy services and products of the SAU. There will be a clear and acceptable projection as to the pay off, the return on the

investment or the pay back period very much like in any productive organization.. In the initial phase of IT evolution benefits are of the immediately obvious. As the impact of IT becomes more and more and systems becomes more sophisticated benefits begin to be questioned. Business IT strategy becomes essential in SAU also if proceeding with IT is to be justified. As an SAU achieves success with IT and IT begins to impact and also underpin, it becomes critical and even the most important factor supporting university's activities. It will be come a critical aspect to

- make possible increase in efficiency of organization, teaching, learning, research extension, development and all other activities and function;
- prevent costly disastrous or misfortunate discontinuities either in the processes, technological upgrading or communications;
- bring in up-to-date course content, methods of teaching, research projects on aspects essential for the community etc. without the technology being a constraint and
- ensure quality of education, research and systems alignment.

In an SAU or other organization that has not experienced in any depth the potential of IT opportunities development at the initial stage can give high motivation and an exposure to the advantage of IT. But when an SAU reaches IT maturity advantages will reduce. Strategic planning of information systems in an SAU will avoid need for beneficial chance elements for success. In strategic environment one is better able to steer around some of the traditional stumbling blocks to successful implementation of information technology.

7.1 Planning Model

For describing the way in which the process of information system development can be aligned to university's goals a structured model of the strategic planning process can be helpful. A model prepared by KAU to the library and information management system consists of two levels. First is dimension of the university in its totality. The second is the operational or departmental level which is the statutory department of the university for managing library and information services. The time scale will depend on various factors, like the willingness of executive to recognize the need for long term thinking, the relevance of utilizing new technologies in education, research, extension and development activities and the pace of change peculiar to the SAU considered. First for

topdown approach at top most level an understanding of the present activities of the university, its strength, weakness, the environment in which it operates, the academic culture, projects and functioning is essential. This is a difficult task. Then with the help of this top level plan, understanding of the unwritten and documented objectives of the university projections and views of various influencing factors; a plan is to be drawn. Then the third stage is to be defined for five or more years hence. Here maximum bottom up IT to IS input becomes possible. There will also be input to the systems from outside, like other universities and research institutes, software developers and scientists. The output from the model is migration path. It will begin from a well defined point which will define the present set of systems, the existing organization and management characteristics. It will broaden out overtime, but with a consistent architecture supporting the options at extremes. The migration path will be flexible in its definition and responsive as one progresses through time. An information system strategy will not be static. It has to be revised periodically in order to update the assumptions and to respond to internal as well as external changes.

8 Important Factors

Of the various factors the following should be recognized as important by the person are group analyzing and preparing the strategy.

- ITS and IMS the components of Information system.
- The individual or team preparing strategy should have skills for presentation that will be accepted and should recognize the interaction of various issues which stretch beyond simple consideration of the technology.
- The increased level of risk associated with systems investment if any not considered during strategy formulation.

Broad management perspective of the activities of library and information system, as well as activities of all other departments of the SAU is essential for strategy formulation. This require second level managers that is those in the level of Registrar, Comptroller, Directors whose functions cut across department, Director of LIS, University Librarian or Deputy Directors who deal with information and documentation etc. But these managers can be least spared from their normal duties. Of these the most apt manager will be Director of Library Information System, University Librarian or Head of Library/Documentation Division for it is their responsibility to manage the library and information services of the

university or institute. Ninety five percent of the information stored will be under their control. It will be their responsibility to extend services across administrative or subject departments under other managers of his equivalent status. 90 per cent of the use of computers and communication systems will be to provide such services or access services of their unit. Hence, Heads of Library or Documentation Divisions are the apt persons to formulate Information Technology Strategy or to lead the team managing it. They have the liaison with the executive and are members of the Academic Councils, Boards of Studies and management group of the SAU or the university or institute so that they will be able to understand the need of the system and formulate it with total concept and according to the actual requirement.

The putting up of scientists from other fields except library and information science, information technology or computer science or other people from lower level of some unit which has nothing to do with information services or have the required specialization will affect the university's successful existence and will also waste crores of rupees spent for information technology aspects. Strategies also can not be developed on an additional duty basis. This attitude of giving an indifferent unimportant role to information strategy can not be changed unless the people at the top who still regard library and information systems as an unimportant appendage necessitated by conditions to get grants, and it as something to be introduced as lot of funds for that can be flown in are to be educated to understand the power of information. Another thing librarians have to note is they have to under go the metamorphosis into information managers absorbing current technology. If they are to retain credibility they should be able to provide solid services using IT to the scientist and students at different stages of development according to the capacity of each development stage. The aim of long term information system plan is not for delivering a fully integrated system in a prescribed period. The plan should be able to cope with short term requirements of education, research and extension, harness available possibilities and meet existing mandatory requirements efficiently for all such things. But a long delay for the fully developed information system will also waste resources spent.

8.1 Flexibility and Adaptability

Successful implementation of strategic planning and the expected functioning of the system at an SAU will necessitate flexibility and adaptability which should be there in the sense listed below.

- as there is no fixed formula applicable to all SAU's, universities or institutions, the strategic planning exercise to be conducted should be very carefully considered;
- the proposed strategy should be flexible and should permit adaptation to changes necessitated in changed situations and time and
- the final design presented should be such that it is not invalidated by any predictable changes in university's strategic emphasis or foreseeable development in technology to be used mainly in its library and information systems.

8.2 Priorities

The following criteria can be used for assessment of applications and projects that should form part of the eventual strategic plan.

- in regulatory terms i.e., to meet requirements of a statutory regulatory order or in defensive terms i.e., as a response to current situations and developments is the project mandatory. Is the project providing infrastructure for other parts of the strategic plan;
- is the internal dependence to be recognized in the ordering of projects and
- is the organizational changes anticipated or required which need system development.

The real value of strategy formulation for Information Technology in an SAU is to be found in the context of the university's information management strategy. The overall message of strategic planning in the information system arena is the need to take an holistic view of the role and term validity in its development into practical working systems. The users are not just recipients of new applications but they are party to application planning and development and will be affected directly by organizational changes and management restructuring that may need to flow from these developments. Even within strategic framework short term imperatives can be handled effectively.

9 Lessons to be Learnt

A review of the existing information systems in SAUs and other organizations can point our attention to the following aspects.

- the record on controlling and measuring IS investments has not been impressive. This is shared by most universities and other govt. and private organizations. Managers find it very difficult to justify the

costs for purchase, development and use of IT.

- controlling of IT investments is done only at Library and Information Service management Divisions which actually require it but in other divisions in effect huge quantum of unnecessary investments are made which remains spread and invisible.
- the difficulties in measuring benefits and cost are found in universities, government and private institutions, to be major constraints to IS investment.
- there is a strong correlation between control and measurement of IS and higher effectiveness with IS however measured is there.

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