

# GOVERNMENT BUSINESS DRIVEN IT INVESTMENTS.

## **INTRODUCTION:**

The rapid and the diverse growth in the field of Information Technology is possibly the most far reaching and lasting phenomenon of recent times. In a number of countries, now, government departments and agencies in their operations are increasingly and intensively using IT. The use of IT has largely been driven by the need to harness the opportunities associated with the growth of IT both in making manual operations more efficient as also adding value to services being rendered by the government and adding new services to the existing portfolio of services on offer.

## **IMPERATIVES FOR USE OF IT BY GOVERNMENTS.**

The imperatives for the increasing and intensive use of IT in Governments arise out of several factors. Some of these are listed below:

- **Rapid Development of IT.**

The fast evolving sphere of Information Technology has created tremendous opportunities for Governments to use IT effectively in its operations. There has been a phenomenal growth in the processing and storage capacities of computer systems and an increased availability of new software applications to perform a wide variety of tasks and operations. Adoption of these provides tremendous scope for improving operations, adding value to services and the performance of new services. Some trends are specifically significant:

- Development of IT -based networks largely powered by the development of the Internet, intranets, telecommunications and network computers. This development has created new avenues for several information services involving storage,

searching , collecting and supplying information.The growth of networks , has brought in its wake the spread of EDI, e-mail, e-commerce and e-governance.

- New technologies have emerged that allow more efficient information storage.Data mining and warehousing are becoming common phrases.IT allows departments to cooperate by opening up the possibility of data integration and matching.
  - The emergence of object -oriented tools for systems development has made development of complex IT based systems quicker and simpler.
  - Transactions in government are increasingly being processed electronically with transactions being received electronically. The whole scenario is one of a significant shift to a less paper electronic environment.
  - There is an emergence of expert and automated management systems .This equips the government organisations with better systems for managing , supervising and controlling operations.
  - The growth of mobile PCs and access to networks allows remote access to central computer and data resources altering the divisions between home and work place.
  - With the growth of IT considerable effort is being directed towards development of new and improved security measures allowing use of smart cards for obtaining different services.
- **Reforms in management of Government operations:**

Many governments are currently executing wide-ranging reforms in the public sector aimed at making public sector operations more efficient and effective. Tasks and operations of government agencies are being scrutinised closely with the objectives of making these more focussed, eliminating unwanted tasks and devolving certain others to agencies outside government such as private companies or local self government units. This exercise of reform and reorganisation requires availability of information on the organisation's structure, operations, performance and the effects of

its performance. IT services can also be used to provide a feedback mechanism for government services.

- **Need for achieving greater efficiencies in Government operations.**

With reinforced emphasis being put on good governance and accountability public expectations from governments have risen. There is also an increasing perception that the government sector should match the efficiency and customer orientation of the private sector. In this context use of IT holds considerable potential for achieving greater efficiencies in government operations.

- **Need to bring the government and the public closer.**

The public for a long time has been a passive recipient of government services. However, with access to IT and to the Internet the public will come into closer contact with government agencies and will begin to place greater demands on services being provided by governments. IT provides opportunities to the government to make available information held by it in simple and inexpensive ways.

In India evidence of the growing application of IT in Government and added to it of Government's efforts in harnessing the tremendous opportunities offered by IT can be found in the framing of IT policies by both federal and provincial governments and setting up of an IT Taskforce by the federal government. In fact the Federal Government has set up a specialist IT ministry and is contemplating the setting up a Convergence Ministry combining the existing ministries of Information Technology , Information and Broadcasting and Telecommunications. An increasing number of provincial governments have put together plans to use IT for e-governance, service delivery and setting up of public information systems.

## **AREAS FOR IT INVESTMENTS:**

Government Business driven investments in IT can take the following broad forms:

- Investments for general development of IT in a country involving various components ranging from launching of communication satellites, setting up information gateways and telecommunication network , to providing fiscal and other concessions to software developers and hardware vendors.
- Investments in the development and implementation of specific IT projects in different business areas to handle specific organisational tasks and activities such as financial accounting, management information processing, document processing, ,inventory management, project management, provision of services etc
- Investments in IT related infrastructure such as communication networks, data warehouses, training and upgradation of skills, hardware and software support systems, IT services etc. These investments spawn across organisations and within organisation across units.

This paper focusses on the IT investments in specific IT projects and systems.

Investments in IT by Government departments can be categorised based upon the function for which the investment is made.

- Accounting and Financial system
  - e.g. Payroll system, day to day accounting or periodical accounting systems, Financial management system . etc.

*A project for Computerisation of Compilation and Preparation of annual accounts of provincial Governments involving substantial investment (about \$12.5 million dollars) is being executed by SAI-INDIA as part of its accounting functions .*

*The Indian Income Tax department as part of its “Comprehensive Computerization Programme” has undertaken Computerisation of Tax Accounting System.*

- Operational Systems
  - e.g.Passenger Reservation System.

*The operating strategy of Indian Railways for improving the quality and reliability of passenger services includes computerisation of passenger reservation system and improving information and guidance system for passengers.*

- Assesse and assessment Information systems in the Income tax Department.
- Management Information Systems.

It may be derived from the earlier two categories or be an independent system which can be integrated/interfaced with any of the above categories e.g. Personal Information system, Monitoring of Various parameters in an organisation.

In recent times the growth of public networks and development of web –enabled applications has led to the emergence of the concept of e-governance.This essentially has involved electronic availability and delivery of various services in various government departments .Further, government departments are using of their websites for disseminating making considerable information to the public ,the objective being provision of **Simple,Moral,Accountable,Responsive** and **Transparent** Governance.(SMART)

**GENERAL ISSUES THAT COUNTRY PAPERS COULD RESPOND TO ARE:**

Issue 1: Has a documented IT policy been formulated in your country?

- What are the broad objectives of the policy?

- Have performance assessment parameters been specified by such a policy?

*In India the Federal Government, its departments and all provincial Governments have formulated IT policies especially in the wake of the possibilities that have emerged with the growth of networks and the idea of e-governance. Such policies have laid down broad objectives for government's activities in this field and specified laid down performance parameters for government agencies implementing IT systems.*

Issue 2: What are the areas in which the Government departments have made IT investments?

*In India, as given above the government investment in IT has covered all the aforesaid categories*

Issue 3: Are there over all guidelines for investment?

*In India, each governmental department has to provide 2-3 per cent of its annual budget for investment in IT.*

*As per the Department of Electronics of the Indian Government, within the next five years least 25% of the Government dealings and services are to be delivered electronically through computers, telecom, TV.*

*The paper will use two case studies .*

*The first is an IT project called the Voucher Level Computerisation(VLC) Project. This project is being implemented by the Office of the Comptroller and Auditor General of India for its field offices dealing with accounting functions of provincial governments. The project involves computerisation of compilation and preparation of accounts of the provincial government. The project covers all the provinces of India and has a projected outlay of Rs 12.5 million.*

*The second is an IT project implemented by the Income Tax Department of the Government of India for Comprehensive Computerisation of the department with a view*

*to improve the efficiency and effectiveness of the administration of Direct Taxes. The project had a budgeted outlay of Rs.340 million. The system envisaged development and implementation of nine applications covering "Assesse Information System", "Assessment Information Systems", "Tax Accounting Systems", "Individual Running Ledger Account Systems", "Enforcement Information Systems", "MIS", "Resource Management Systems". The project was audited by SAI-India and the case study will highlight findings from this audit.*

### **DETERMINING NEED FOR IT INVESTMENTS.**

A carefully researched and well defined strategic plan is a pre requisite for ensuring that the information systems that an organisation develops/procures fully meets business needs economically, efficiently and effectively. It is essential for the auditor to determine that a rationale for a particular IT project exists in the sense that the need for the project has been determined in the Strategy document. This will also ensure that the project's objectives are in consonance with the overall objectives of the organisation.

Information has become a vital resource and its use is required to be planned carefully. Further use of IT Systems have far reaching consequences in that they alter significantly the manner in which organisations operate, there is a need to acquire and upgrade skills, large capital investments are involved and lead time for delivery is long. Failure to plan strategically for IT systems has the following risks associated with it:

- Failure to exploit the benefits of IT as also the potential benefits of emerging technologies for meeting business needs.
- Wastage of resources on technical fashions rather than on technology appropriate to business requirements.
- Development of incompatible systems.
- Failure to allocate resources appropriately.
- Overlooking essential tasks and undertaking unnecessary ones largely flowing out of failure to prioritise work properly.

IT Strategies have the following essentials:

- They interpret business strategy by expressing business needs in IT related terms.
- They identify medium term resource requirements and determine a framework for setting priorities, concentrating resources in key areas and allocating responsibilities for achievement.
- These should be laid down in a formal document to ensure that its requirements are fully and consistently conveyed to those who are responsible for delivering them.
- It is essential that Senior Management is fully committed to the strategic plan and that it is clearly communicated to staff at all levels in the organisation.

The building of the IS Strategy is should be treated as a project and a structured and staged approach should be adopted in formulating it. An effective management framework is needed to ensure that the strategy is effectively monitored, that it remains relevant and that delivery is on course. This framework would include Steering Committees at the highest levels, IT committees and project boards.

Given the importance of having an appropriate IS Strategy for ensuring the effectiveness of IT investments auditors auditing IT systems would require to consider the following issues:

- Is there an IT Strategy and whether it is appropriate to the size and structure of the organisation. Has the strategy been endorsed by the Senior Management?
- Is there an adequate management framework for implementing the Strategy?
- Is the Strategy well publicised and is it up to date. Is it compatible with the Organisation's overall strategy.
- Has the Strategy been translated into a portfolio of projects and have these been prioritised. Is the particular IS project being audited a part of the portfolio and is the priority assigned to it appropriate to the business needs of the organisation.

*The VLC System being implemented by SAI-India emerged out of the recommendations of an Accountants General Conference that discussed and finalised an IT strategic plan. The Strategic plan was translated into a portfolio of projects that was prioritised as per the organisation's objectives.*

## **FEASIBILITY STUDY, PREPARATION OF BUSINESS CASE AND INVESTMENT APPRAISAL:**

The need for investing resources in an IT project should stem from organisation's IT Strategy and from the portfolio of projects identified in the strategy document. This is followed by the conduct of a feasibility study which has the objective of defining if a particular project is viable and of setting out a course of action if it is. The feasibility study will define the problem to be addressed; define broad requirements of the needed solution and evaluate broadly the costs benefits risks associated with the various variants of the IT solution. The feasibility study report would either endorse the project ,identify a solution and seek authority to proceed with the project or recommend that the project be not taken forward or scaled down.

If the recommendation is to proceed with the project the study team should prepare a formal business case. A business case should be clear, convincing and well supported by evidence. A standard business case should include the following:

- Why the system is needed.
- The business objectives to be met.
- Long term business implications and staff and organisational implications.
- Alternative options considered and the recommended option.
- All important assumptions should be clearly stated.
- Delivery schedules.
- Benefits to be delivered and risks of not delivering the benefits.
- An investment appraisal.
- An outline of costs and plans.

A business case would need to be continuously reviewed so as to ensure that the project remains viable.

One of the key components of the business case is an investment appraisal to determine from among a range of options the option that gives the best value for money in terms of supporting business objectives. In the process of making the investment appraisal costs and expected benefits should be identified and quantified. While it is easy to identify and

quantify costs accurately benefits may be difficult to quantify. Any benefits in improved efficiency and effectiveness should be identified along with performance indicators and key measures of achievement against which their delivery can be measured.

The results of the feasibility study and the associated business case should be presented to an approving authority and acceptance of a recommendation to proceed with a project could signal the start of the project initiation stage.

The importance of the activities associated with conducting a feasibility study and preparing a business case is that it is crucial for establishing the viability of the project. It gives an assurance that the investment in the IT project would provide the best value for money and would provide the optimal solution. It helps the auditor in identifying expected benefits for subsequent comparison with actual performance.

While looking at this aspect of the management of IT investment the auditor should examine if:

- Adequate number of alternative options was identified during the feasibility study.
- Was each of these evaluated in terms of business benefits, costs and strategic fit?
- Are estimates of business benefits achievable and measurable and have workable methods of measurement been identified.
- Have all elements of costs been included.
- Has the project received formal approval to proceed from the appropriate authority.
- Does the project clearly link with identified existing or future business needs.

*The Comprehensive Computerisation Programme in the Income –tax department was preceded by a proper feasibility study. This led to the formulation of a “conceptual plan” which though detailed and documented in identifying the processes to be computerised and architecture of the proposed solution underestimated database sizing and restricted itself to implementation only to the first phase of the computerisation programme.*

### **PERFORMANCE AUDIT ISSUES:**

The use of IT in Government operations finds manifestation in considerable investment in IT by government. This poses novel challenges for the auditor as often the use of IT has considerable impact not only on the organisation's operations and expenditure but also on the delivery of business benefits and achievement of business goals and objectives. There is an imperative, therefore, to subject these investments to the same examination as would be the case with any other Government investment. It would be necessary to measure the performance of IT investments from the standpoint of whether the resultant business benefits were delivered on time, at a reasonable cost and were of an appropriate quality. Additionally, since use of IT is widely believed to have the capacity to add value to business and to the organisation –in that is expected to make the organisation work more efficiently, openly and methodically- auditors will have the additional task of determining if this additional value has been realised.

Performance audit of computerisation of all or selected activities in a government department can be taken up. Audit of investment in various components forms part of the audit of the investment in an IT system.

Several audits and academic research studies have revealed that IT projects often experience time-overruns, cost overruns and do not perform in the way envisaged. In the government sector additional factors such as budget cuts and the need to meet politically dictated deadlines come into play.

Investigation of IT project failures have revealed that generally projects have under performed because of lack of adoption of appropriate methods for managing and maintaining IT investments. This paper seeks to highlight the impact of use of appropriate IT methods by organisations on the performance of IT projects. It seeks to establish that a judicious use of IT methods will reduce the risk of IT systems being of poor quality, which get delivered late, are overbudget and have reduced functionality. For auditors

conducting performance audits of IT systems explanations for systems underperforming or not performing are found in inadequate application of IT methods in managing and maintaining IT systems. The paper lists out essentials of best practise relating to methods for managing and maintaining IT Investments and questions that auditors should concern themselves with while assessing adequacy of application of these practices by organisations.

While conducting performance audits of IT projects the two most important steps are :

- Identification of evidence of under-performance.
- Identification of explanations of under-performance or project failures.

Poor performance is often attributable to deficiencies in managing and maintaining IT investments.

This paper will look at the management of IT investments and its subsequent maintenance. The former largely concentrates on the phase in which IT systems are developed and built and the latter looks at the operation of the IT Systems.

## **MANAGEMENT OF IT INVESTMENTS:**

Analysis of project failures have thrown up a number of common problems which can be summarized as below:

- IT projects donot flow out of any strategic need.
- Failure to assess and manage project risks which results from unrealistic business cases,technology problems and lack of user commitment to the project.
- Inadequate top management involvement.
- Ineffective project management.
- Mis-management of consultants and suppliers arising out of a failure to seek competitive bids;vague and open-ended contracts with vendors; failure to monitor and control consultancy costs; and lack of independent quality assurance on consultant's work.

- System implementation failures arising out of unrealistic delivery schedules, inadequate acceptance testing; unworkable contingency plans.

Some key steps that could be taken to address these problems are:

- Formulation of an IT Strategy.
- Adoption of an appropriate life cycle methodology to be used in systems development.
- Use of sound project management methodology.
- Perform risk assessments both during and before a project.
- Monitoring of deliverables against targets.
- Avoid significant changes to requirements.
- Continually re-assess the viability of the Business Case in the light of actual costs incurred and changing business requirements .
- Effectively manage suppliers and consultants.
- Effectively manage training and testing.
- Have workable contingency plans.

From the above we can identify certain issues that will have an impact on the successful management of IT investments. These are:

- Framing sound IT Strategies.
- Conduct of feasibility studies and preparation of a business case.
- Adoption of a staged life cycle approach to system development.
- Ensuring adequate top management involvement.
- Adoption of a recognised project management methodology.
- Adoption of efficient and effective procurement procedures.

**Adoption of a staged life cycle approach to system development.**

A critical measure to enhance management of IT investments is to ensure the adoption of a staged life cycle approach to system development. The development or acquisition of information systems can be affected by many risks such as that system will be never delivered or will be delivered late; budgets will be exceeded; the system will divert user resources; the system will not deliver the required functionality, it will have errors, it will be difficult to use, be difficult and costly to maintain and enhance, it will not perform to required standards etc.. If one or more of these are in evidence in a project the underlying causes are largely those relating to deficient management.

The risk of failures can be significantly reduced if the project is broken into a number of more manageable stages each one of which is to produce one or more pre-defined products. The benefit of such an approach is that the complexity of planning, monitoring and controlling a project gets reduced. It also offers a number of points during the project at which progress against pre-defined deliverables can be reviewed and corrective action be taken. Collectively these stages comprise the Systems Development Life Cycle. Historically development of several systems has been done under the dominance of an organisation's IT department with little or no user involvement. In such cases the system eventually developed failed to meet user requirements and the organisations have failed to fully reap the benefits on their investments.

*It was clearly laid down that the VLC project developed by SAI-India would strictly adhere to the "System Development Methodology" adopted as a standard by the SAI-India. This methodology prescribed a staged and structured approach to system development. It was also decided to appoint auditors for the project who would evaluate the project at each stage of the project.*

The key activities and concerns under each stage of the SDLC is dealt with below.

### **Project Initiation:**

This stage commences after the project has received formal approval. During this stage the ground work for the future management of the project is prepared. A project initiation document is prepared laying down the project objectives and time schedules; management and organisation for the project; all project deliverables; technical and resource plans; quality criteria; risks faced and ways to address the risks. The PID would therefore become an important checkpoint for future evaluations of the projects progress. It also provides critical benchmarks to the auditor doing a VFM study of the project.

*The VLC Project of SAI-India was initiated by a report prepared by a committee comprising of Accounting and IT Specialists. This document laid down project objectives, time schedules, management and organisation for the project, project deliverables, technical plans, quality criteria etc.*

### **Specifying User Requirements:**

Framing the User Requirement Specifications is perhaps the most critical phase of the development cycle in that it critically affects the system's eventual ability to generate expected benefits and meet the organization's business needs. The URS is a formal description of the user's requirements of the proposed system. It provides the basis for designing the system or the basis for procuring systems. Acceptance testing procedures and user manuals are also framed on the basis of the URS. A URS is required to be signed off by the system's eventual user. Building a URS would require inputs from multi-disciplinary teams, potential end-users of the system and other groups such as personnel department, computer operations department, training, legal department and the internal and external auditors. The process requires extensive study and analysis of systems.

Some of the aspects relating to this stage that the auditor could examine are :

- All potential system users have contributed to the SRS.
- That the SRS incorporates adequate internal controls and a financial audit trail.
- That the SRS is comprehensive, well set out and unambiguous.

- That the SRS confirms to the IS strategy and the project's scope, budget and time schedules as specified in the business case.
- That the SRS has been accepted by the system's potential owner.

*In the VLC Project of SAI-India the aforesaid committee drew out broad specifications for the system that was the basis of preparing tender documents for software development. This was followed by a detailed exercise involving all potential users of the system for drawing out a detailed System Requirements Specification.*

### **System Design and Development:**

During the design stage the primary concern is to ensure that the systems design matches systems requirements as closely as possible and provides a sound basis for subsequent development work. The task here is to translate the URS into detailed system designs and technical specifications. System design work is a technically complex task and most of the work is undertaken by system analysts and other technical specialists. The three important products in this stage are :the logical design-an abstract design that provides a technical solution; technical specifications-detailing how the URS is to be met in terms of hardware and software to be used; physical design-which maps the logical design onto the implementation environment.

During the development stage the technical specifications are used to develop an operational system. The important activities are software development; preparation of user and operational manuals; business continuity plans; and plans for systems building ,testing, training and implementation.

Audit of the activities at this stage may require expert assistance. However, some general questions the auditor may ask are:

- Does the system design conform to a defined and acceptable standard; have the designs been discussed and agreed with users.

- Are there appropriate quality assurance procedures and do they follow accepted standards.
- Have internal controls been incorporated in the design and development specifications.

The auditor may also examine provision or presence of effective configuration management, change management procedures, system installation plans, training plans, acceptance testing plans etc.

*In the VLC project detailed systems design were prepared in accordance with the SRS. The hardware requirements were specified and formed the basis for procurement of hardware. The Systems design documents were subjected to review by the users. The development phase encompassed a wide variety of activities including determination of change management procedure, system installation plans, training plans and acceptance testing plans.*

### **System Building and acceptance testing:**

The objective in this stage is to build an environment in which the new system will run and also to ensure that the new system is of acceptable quality. Users need to be closely involved especially during acceptance testing.

Building the system involves installing and acceptance testing hardware equipment; loading and configuring system and applications softwares; creating files and databases; loading masterfile data; setting up users and file access levels.

This stage also involves operational testing which has the objective of demonstrating that the new system will work successfully in the live environment. It comprises of system testing-to show that systems will meet agreed requirements under all operating circumstances; installation testing; acceptance testing –with the aim to gain acceptance of users to seek assurance that the system meets requirements in terms of functions, performance and usability.

Acceptance testing is aimed at providing users with the confirmation that the URS has been met; system and user documentation is accurate and usable; supporting manual procedures work properly; all ancillary support functions are in place and are functioning properly. Bulk of this testing is done by users but there could be a need to follow a pre-defined acceptance plan.

The auditors could concern themselves with checking for the existence of and reviewing data conversion plans, arrangements for system building; existence and review of acceptance test plans and their implementation.

*In the VLC Project procurement of hardware and preparation of sites were scheduled such that procurement and related activity was completed by the time phase I software became available for creating master files. All test plans were implemented and modifications indicated based on the tests. Results of acceptance tests were evaluated by users.*

### **System Implementation**

The stage of system development comprises of a number of activities the completion of which leads to the delivery of an operational system. The activities include training, creation of user groups, service level agreements, formulation of system security policy and preparation of business continuity plans. Implementation could involve a choice between the following approaches: cut-over, phased implementation, pilot projects, parallel runs.

Auditors should check for proper transfer of data, implementation of backup and recovery procedures, presence of adequate documentation for users and the system, completion of training activities, presence of system security policy and business continuity plans.

*In the VLC Project all relevant elements have been implemented. Training plans for various levels of users have been executed. Service level agreements and maintenance contracts have been appropriately drawn up. A phased approach has been adopted in implementation to enable a phased development of the system. Additionally a limited*

*parallel run of both the manual and computerised system has been envisaged to enable comparison of manual and electronic outputs and reconciliation between these.*

### **Post Implementation Reviews:(PIR)**

This is the final stage of the development life cycle. The objective is to establish in an impartial manner , whether,if the business objectives are met; user expectations are satisfied and technical specifications complied with.

The auditor can examine the effectiveness of the PIR.

*In the Comprehensive Computerisation Programme of the Income Tax Department no independent evaluation study was conducted to examine if the intended benefits were achieved even though the project was launched in 1994.*

### **Involvement of Top Management:**

IT Systems can underperform if there is inadequate involvement of top management in the management of IT Systems. Though the role of the top management is critical to several facets of IT systems its role in the formulating, supporting and monitoring of a business driven IT Strategy is of paramount importance. An IT Strategy translates an organisation's business strategy in IT terms and catalogues IT requirements in various areas of business and aligns IT plans to business needs. It is therefore a top level statement of direction for use of information technology. In this background it is essential that an organisation's IT Strategy has the approval and full commitment of top managers. A critical element of the management frame work for the IT Strategy is the IT Steering Committee. It is essential that this Committee has senior managers as its members representing all business areas of the organisation. The Steering Committee should form the institutional basis for top management involvement and should discharge the following functions:

- 1.direct and monitor implementation of the strategy.
- 2.Ensure benefits are delivered and objectives are met.
- 3.Prioritise between IT projects.
- 4.Ensure availability of funds and resources for approved projects.
- 5.Ensure formulation and implementation of technical and management policies and procedures to support the IT Strategy.

Failure to secure adequate top management commitment to IT projects opens the prospect of project failures arising out of lack of strategic direction,lack of resources for IT projects and inadequate creation of management and technical procedures.

Some barriers that would affect the role of top managers could be as follows:

- Lack of institutional arrangements for securing top management involvement.These would include absence of steering committees and absence of project management methodologies.
- The organisation may not have a formal business strategy making formulation of long term IT Plans difficult.Hence top managers may not have a strategic framework for directing,supporting and monitoring IT activities.The result could be that top managers may could support systems that are not in consonance with business needs.
- Top managers could themselves be faced with the need to follow politically dictated priorities leading to IT projects which do not meet business needs being taken up.
- Inadequate appreciation on part of top managers of opportunities and benefits from Information Technology leading to reluctance on the part of top managers to consider IT solutions.On the other hand lack of adequate understanding of IT could also manifest itself in over reliance on IT professionals at the expense of users of systems.
- Top managers may not have full autonomy in allocating resources especially in the government sector where budgets and resource allocations may have to be approved by the finance department.
- Top managers may have competing demands on their time and on the organisation's resources and this could lead to inadequate attention to IT projects.

Possible ways for overcoming these barriers could include:

- Creating institutional arrangements for top management involvement. These would include mandatory constitution of IT Steering Committees, mandatory consideration of IT Strategic Plans, Feasibility Studies and Business Cases by top managers. These could be codified in organisation's policies and procedures.
- Ensuring formulation of Business Strategy Plans from which the IT Strategy Plans should flow out. This would provide the strategic framework to top managers for directing and monitoring IT Activities.
- Top Managers should be made aware, through appropriately designed workshops and seminars, of the benefits and opportunities from IT.
- To ensure that IT projects receive adequate attention and support from top managers, besides securing institutional arrangements for their involvement, a clearly defined management framework supported by a proper management information system should be established so as to facilitate top management supervision of IT activities. If feasible IT operations in the organisation should be placed under a senior manager so that enough weight is lent to IT within the organisation.

Auditors conducting performance audit of IT projects should, in case they find evidence of under performance, establish if this is due to inadequate top management involvement. They should specifically check if the organisation has adequately assessed the problems that top managers could face and if adequate counter measures had been adopted.

In the project for Voucher Level Computerisation adequate involvement of top management has been ensured. As stated earlier the need for the project was established during a conference of provincial accountants general. The project was part of the catalogue of IT Activities planned for the next few years. At the central office the project was initially placed under the Deputy Auditor General who fortnightly reviewed the progress of the projects through reports and over longer periods through meetings. The CAG of India also reviewed project progress each month and personally reviewed progress at project sites during his inspection visits to field offices where the project was being implemented. Top management involvement also ensured that project received all

required resources. At the project sites project teams were constituted and were led by Senior Officials.

In the Project for the Comprehensive Computerisation of the Income Tax Department there was no evidence that the IT project had been derived from any organisational strategic plan. At the national level responsibility for the project was with the Directorate of Income Tax (Systems) who reported to the Member (Investigations) in the Central Board of Direct Taxes. At the regional level the overall charge of the project was with the Chief Commissioner of Income Tax who was assisted by a Commissioner of Income Tax (Computer Systems). This gives evidence that institutional arrangements were in place for involvement of top managers. However, there was no steering committee for overall strategic direction for bringing together senior managers from all business areas. There is also evidence that the top managers were not free to allocate resources and the project was dependent for funding on a general purpose government committee that approved fund allocations. This could have affected the general progress and speed of implementation. There is evidence that a software for allotting Permanent Account Numbers was developed separately at extra cost just to enable allotment of PAN numbers to certain VIPs at the time of inauguration of a computer centre. This is evidence of top managers being guided by considerations not based on business needs.

### **Use of sound project management methodology.**

Adoption of sound project management techniques is an important prerequisite for proper management of IT investments. An appropriate project management and organisational framework should be determined at the stage of project initiation itself. For successful project management the following are essential:

- There must be a clear and concise statement of what the project is setting out to achieve and this must be understood and accepted by all the stakeholders.
- It is essential to identify who the eventual customer of the project's deliverables is. The customer is the main beneficiary of the project and will have an important role in agreeing with the project goal and providing essential support.

- An effective change management system is essential to safeguard projects from uncontrolled changes.
- For successful project management an effective project organisation should be created with proper definition of roles, responsibilities and reporting lines.
- A properly used project management methodology will promote the successful establishment, operation and closure of a project.
- All risks associated with projects should be identified and appropriately managed.
- Since projects very often form business relationships between groups of people who normally donot work with each other, appropriate team building measures should be adopted.Openness and honesty should be encouraged so that problems are not disguised.
- Projects involve movement from one system to another and hence a clear transition strategy is essential to a project's success.
- It is essential to have an experienced project manager with sufficient status in the organisation .

Poor project management:

- may cause cost overruns when control and coordination are inadequate and projects are not aligned to business needs.
- may result in lost benefits.
- may cause loss of direction as no clear vision is expressed and communicated to the stakeholders.
- may result in delayed delivery when priorities are not clearly assigned and changes are not properly managed.

The benefits of project management are that:

- Senior managers can set priorities and make an informed choice between priorities.
- It allows successful planning, execution, coordination and control of projects.
- It ensures that transition from old to new is well managed.
- Management can concentrate on a defined set of business benefits.

Auditors should check for the existence of a proper project management framework.

*The VLC Project was broken into six zones to enable development of systems at a manageable scale and allow for systems to accommodate regional variations. Each Zone had its own project team with a designated project leader and members representing different user groups and the IT department. Representatives of the chosen software developer were also included in the project team. At the central office, work in each zone was monitored by the Central EDP department through progress reports, presentations etc. A selection of outputs were reviewed at headquarters to provide adequate quality assurance.*

### **Adoption of proper procurement practices.**

Organisations, after creating System requirements specifications, may instead of designing and developing systems, decide to procure an IT system. In fact procurement of IT systems rather than building these is becoming the preferred option. Acquiring computer systems is, however, a complicated and a difficult exercise and the risks associated with it need to be managed by a careful management of the procurement process.

The need to have proper procurement methods managed by skilled and experienced staff is highlighted by the following:

- The cost of making procurements is controlled so that it does not outweigh the benefits of adopting the procurement route.
- The needs of the procurer are clearly and completely expressed and used to evaluate the suppliers' proposals. Proper guidance for procurement of systems is provided so as to enable systematic and consistent evaluations of bids and tenders. This would prevent fraud and corruption.
- IT procurements must comply with relevant laws and regulations so that unlawful procurements are avoided.
- IT procurement methods should contribute to achieving VFM by ensuring procurement of systems of a consistent quality at minimum costs.

For proper management of the procurement process a staged approach should be provided. The early stages of strategic planning, feasibility study and requirements specifications would correspond to similar stages for building systems and so would the later stages of system installation, acceptance, implementation, evaluation and PIR. The new stages that would need to be incorporated are supplier evaluation, contract negotiations, final evaluation and award of tender.

Procurement systems should be based on complexity of the systems with larger projects requiring greater control.

An auditor should see if :

- That organisation's procurement procedures are fully documented and complied with.
- There is an effective policy to prevent corrupt practises.
- Procedures ensure fair competitive tendering.
- Since project failures at times are attributable to poor relationships with suppliers arising out of inadequate contracts the auditor should carefully examine contractual provisions.

*For the VLC Project controlled procurement procedures for both software development, operating and database software, hardware and peripherals was adopted. Committees were formed consisting of IT specialists and users to finalise tender specifications and documents. Open competitive bidding was resorted to and technical and financial bids were invited and evaluated seperately. Financial Bids of only those vendors who were found technically suitable were evaluated. Final Contracts were vetted by the legal department and provided for standards of performance and for performance guarantees. Responsibilities of the organisation and the vendors were clearly spelt out and project deliverables with time schedules for delivery were identified and agreed upon.*

*Some of the audit findings relating to the "Specification, design and procurement phase" of the "Comprehensive Computerisation Programme" of the Income-Tax department are as follows:*

*A. Software:*

- The project envisaged development of 9 application software. The job of software development for 8 of these was awarded to one firm. Of these 5 were interrelated and three were independent systems. The department made no attempt to distinguish integrated components of the software system and prioritisation of the systems. Accordingly a single time period was determined for delivery of all systems as a result of which complete delivery of all the applications had not been accomplished even at one centre. It was felt that proper prioritisation would have helped savings in time, cost and allowed the organisation to derive benefits from the systems at an earlier date.*
- Time for Software development was increased beyond tender specifications while awarding work to the software developer. Even this time period was repeatedly extended. Audit found that actual installation of 6 out of 8 systems were delayed by 6 to 14 months beyond the agreed extended periods.*
- The SRS prepared by the vendor deleted specification in tender documents relating to response times.*
- The Software design documents underestimated hardware sizing and hardware procurement was commenced even before the SDD was finalised. Consequently many centres are already facing problems with regard to inadequate capacities.*
- Tender conditions relating to design and development of application software envisaged that applications software should have capability of capturing and utilising data through OCR from a wide variety of input documents. However, none of the applications software packages developed had the facility to capture data through OCR using bar coding technology. The OCR facility was later provided but could not be used due to a variety of reasons. This indicated inadequate consideration by the auditee of the OCR requirement during the system specifications stage. Failure to use OCR led to additional expenses on outsourcing of data entry work.*

*Hardware:*

- *Tenders for hardware procurement were floated before finalisation of SRS.Hence hardware procured were under configured.*
- *Marketing and overhead expenditure was paid to the vendor in violation of standard procurement procedures.*
- *Procurement of hardware was not synchronised with software development.Hence hardware was in place long before the application software were delivered.*
- *Discounts offered by vendors were only partially availed of.*
- *Proportionate reduction in warranty charges were not made even though certain hardware items were not procured.*
- *No penalties were imposed o vendors who were awarded work but later on failed to execute the work.*
- *Modems and an OCR option file server could not be used after purchase as these were not as per requirements.*
- *Delivery and installation of hardware was considerably delayed in most cases.In many cases this was due to sites not being ready.*
- *Orders for hardware were split but placed on the same vendor on the second occasion without inviting fresh bids.*

*Networking:*

- *Options for networking were inadequately considered.*

## **MAINTENANCE OF IT INVESTMENTS :**

In this part of the paper we turn our attention to maintenance of investments in IT Systems. This stage corresponds to the actual operation of systems. Several projects , though well managed during development, could under perform or fail if organisations donot properly apply IT methods relating to maintaining and operating IT systems.Poor operational management of systems lead to user dissatisfaction,unreliable systems , cost overruns,high level of running costs,disputes with suppliers all evidences of systems that are performing poorly.The auditor's concerns revolve around the following:

1. Is the IT system delivering intended benefits and expected savings.
2. Is the IT Systems operations ensuring achievement of organisational tasks and goals.
3. Is the system viable in terms of the costs of operating the system.
4. Where IT systems are handling critical functions have appropriate IT methods been adopted to ensure business continuity and disaster recovery.
5. Are arrangements in place to ensure continued availability of quality IT services from the IT system.

The auditor would look for the effective presence of the following:

- Periodic evaluations of IT Systems.
- Maintenance/Service level agreements both for hardware and software.
- Change Management procedures.
- Effective Internal Controls and IT Security.
- Disaster recovery Planning and Business continuity strategies.

The VLC Project of SAI-India is in the final stages of implementation and will become fully operational in the next few months in all regions. Implementation will be followed by a Post implementation Review. A well defined plan for maintaining the IT System has been formulated and incorporates best practise relating to Infrastructure Mangement, Internal Controls, IT Security , Change Management and Business Continuity Strategies.

*Our audit of the "Comprehensive Computerisation programme of the Income tax Department made the following observations with regard to operation of the IT Systems.*

*A. Software:*

- In the case of the Permanent Account Number (PAN) Allotment Systems it was noticed that though the task of allotment of PAN was visualised to be a part of the Assessee Information System a separate application was developed for one time allotment of these numbers in the major cities to take care of some non-business considerations at an avoidable extra cost. Several shortfalls were noticed in allotment of PANs. The PAN system did not include features that could prevent issue of multiple numbers to the same person.*
- Assessee Information System (AIS): This system was supposed to enable creation of a database for all taxpayers and would be central to the entire scheme of computerisation with the PAN forming a link between information available in each package. However, there was considerable delay in creation of PAN Data and transfer of data from the separate PAN package. Since all other applications were dependent on the AIS becoming fully operational the above delays led to benefits from computerisation not accruing at all till March 1999. The software also suffered from several design defects and created bottlenecks in operations.*
- The Assessment Information System (AST): The system was meant for automated processing of tax returns. However, the use of the system was very limited even after two years of installation and two software modifications.*
- The Tax Deduction at Source Information System: This system was yet to be completely developed even after four years of the scheduled dates.*

- *Tax Accounting System Software(TAS):This was to facilitate preparation of accounts of tax payments and refunds based on tax receipts and refund vouchers. Audit found that the processing of source documents was only 17% of the total.There were also considerable delays in preparing detailed accounts through this system.Several other key outputs were considerably delayed.These delays severly undermined the utility of the system.*
- *Individual Running Ledger Accounts System:This system was to keep a complete account for each assessee but was critically dependent on other systems becoming operational.Consequently the software though installed was not ready for operation in most places.*
- *The Enforcement Information system and the Management Information System though installed in 1997 was not being used as networking had not been completed till 1999.*

#### *B. Networking:*

- *The existence of high-speed 64KBPS speed , though assumed was not met in practice and networks were found to be inadequate for on-line computing.Further the sizing of networking was not done with reference to requirements of the applications systems and consequently operations have suffered due to network down time.*

#### *C. Training:*

- *Since contracts did not prescribe target dates for completing training on use of PCs considerable shortfall was found in completion of training.*
- *Training contracts were awarded to two companies of which one sub-contracted the work to other agencies in violation of tender conditions.In one case training contracts were awarded without competitive bidding.*

- *For training in computer operations training of 5000 personnel was to be completed by December 1997. However over 10% of the officials remained to be trained till March 1999.*

### **Periodic evaluations of IT Systems.**

Periodic evaluations of IT Systems are necessary for assessing if IT projects are well managed and are delivering the intended business benefits. There should be regular evaluations of systems- the first one within six months of implementation. Such evaluations can be self-evaluations or can be conducted by third parties such as independent consultants , internal auditors etc. Evaluations could be extensive or basic based on monitoring through periodic Management Information reports. The benefits from evaluations lies largely in the lessons to be learnt from the past and would allow reductions in costs and risks for providing IT and enhance quality of systems. Such evaluations help monitor costs and benefits from investments in IT and identify reasons for negative movements in these. In sum such reviews evaluate the systems achievements against envisaged achievements, compare actual system performance against specified performance levels and actual operating costs against original estimated costs. Such reviews may identify need for changes and in extreme cases abandonment of systems. The important fact is that reviews should help formulate plans to move forward from the current position rather than merely understand historical reasons for failure. The auditor's concerns are to check if the organisation provides for periodic evaluations, if so by whom and at what intervals. He should also check on procedures for follow-up on such evaluations and reports.

### **IT Infrastructure Management and Maintenance/Service level agreements.**

Proper management of IT Infrastructure is crucial to efficient operational management of an IT System. The key here is to effectively manage suppliers or providers of various elements of IT Infrastructure such as hardware, software, telecommunications, networks, computer sites, data entry and processing bureaus training etc. Well formulated and executed Service Level agreements with these providers are critical as they provide

assurance of continued availability of quality IT services from IT systems. These agreements require users to clearly specify service levels required from service providers. This in turn allows a clear assessment of resources required to achieve required service levels.

SLAs are essential where a system is managed or maintained on behalf of users by a separate service “provider”. The provider could be the organisation’s own IT Department, a facilities management contractor, an external bureau, a telecommunications supplier or a hardware or software maintenance contractor. The SLA lays down a formal agreement on standards of service to be provided and the levels of user demand to be satisfied. Without an SLA there is a risk that system performance will not be related to any measure of service that users require. An SLA should therefore define the required performance objectively so that delivered levels of service can be regularly monitored against that specified. SLAs should also define the level of technical support to be provided to users in various areas including training, procedures for proposing changes in systems, standards of security, contingency requirements and a schedule of charges for services to be provided.

The Auditor should check for presence of effectively formulated and executed SLAs. Different SLAs may exist for different service providers including providers of training. Auditors should however examine SLAs for existence of clearly defined expected level of services, performance standards and indicators among other things. Since these agreements have contractual elements these require to be properly drafted so that systems are protected from the risk of disputes with vendors and service providers.

### **Change Management procedures:**

Organisations should adopt well documented Change management procedures as these are required for optimally balancing the need for changes and the costs associated with implementing changes. IT systems, even after completion of the development phase, would continue to be dynamic entities which require changes and alterations. The changes may have an impact on controls and functionality of systems and hence it is necessary that the change process is controlled and managed as per standards and procedures which are properly documented. Changes could become necessary to enhance functionality

based on user feedback, to make operations easier and efficient, to add capacity, to rectify problems, to improve security, to accommodate routine updates and changes in requirements. Change management procedures should ensure that all changes are authorised, tested, documented and that systems operate as intended and that there is an adequate audit trail of changes. Inadequate change management procedures can expose systems to the following risks:

- Unauthorised changes which could jeopardise the functioning of the system itself.
- Changes may take long to implement and may not be aligned to timeframes to meet business requirements.
- User dissatisfaction where changes do not respond to changes in user requirements.
- Maintenance difficulties which may arise due to uncontrolled and multiple changes and may make systems difficult and expensive to maintain.

The above could cause IT systems to fail or underperform.

Some key elements for change management procedures include procedures for management authorisation, testing of amended software, management review of effect of any changes. All change requests should be recorded and prioritised depending on an assessment of costs of effecting changes and impact of changes on the business and resources of the organisation.

Auditors should check for the presence of documented change management procedures and the effective implementation of these procedures. If there is evidence of user dissatisfaction and high running costs auditors should determine the extent to which these are attributable to inadequate change management procedures.

### **Compliance with Controls and implementation of a well formulated IT Security policy:**

It is well recognised that IT systems are vulnerable to certain inherent risks and if these are not adequately addressed such systems may become unreliable, underdeliver or even completely fail. It is therefore essential that IT systems should incorporate and comply with a carefully designed control and security regime. Often, whereas systems may incorporate appropriate controls and have a security policy, compliance with these may be inadequate. Though controls may be of many types, of special relevance here would

be the “General Controls” which are concerned with the auditee’s IT infrastructure and include IT related policies, procedures and working practices. These controls relate to :

- High level controls related to organisation and management which aims at proper functioning of IT systems so that they satisfy business objectives and consists of laying down of policies and standards for IT Structures, personnel and training, documentation, outsourcing, IT Security and segregation of duties.
- Controls over IT operations so that applications are run correctly without delays and disruptions and with optimum user satisfaction. These include controls in the form of SLAs, management review and supervision, training , computer maintenance, operations documentation and problem management procedures.
- Physical and environmental controls aimed at preventing unauthorised access and interference in IT services.
- Logical access controls can be important to systems whose confidentiality and security are crucial viz: banks etc. and breaches could cause loss of credibility and affect business. Further hackers could gain access and completely disrupt operations.
- Control over third party service providers has acquired tremendous significance as IT services supplied by third parties continue to increase. The performance of systems have therefore become critically dependent on the quality and timing of these services. It is therefore essential that contracts for third party services should be carefully drawn up and implemented. Failure to do this could lead to disruption in operations and disputes with suppliers.

The need for organisations to have appropriate Information Systems Security policy arises out of a recognition that information is a vital resource necessary for fulfillment of critical organisational goals. In addition to expectations of privacy by people whose information are held in systems IT Security is also necessary for the continued and efficient functioning of IT Systems. Organisations are concerned with security because organisations are getting increasingly dependent on IT systems and rely on IT systems for providing a variety of services and for many operations. In a sense IT is key to the

survival of modern business and also governance. With the growth of e-commerce and e-governance and in the financial sector, security has become critical for maintaining business credibility and furthering use of e-transactions, smart cards etc. Further IT systems need stable environments and need to be protected from environmental hazards disasters and disruptions both accidental and deliberate. IT systems also involve considerable investments and these need to be protected.

Organisations should therefore devise security policies that are appropriate, justified and effective with the aim of ensuring confidentiality of information, integrity of information and availability of information by preventing loss of services. Such policies should have senior management support and should have a clear definition of information security, its overall objectives, scope, standards, compliance requirements, responsibilities, reporting and review requirements. Security policies should follow a formal risk assessment exercise and be accompanied by detailed security mechanisms and procedures. The policies should be properly disseminated within the organisation.

Auditors should check for existence and adequate compliance with internal controls in IT systems especially those which are relevant to delivering quality, timely, continued and reliable IT services. Auditors should also check for existence and implementation of appropriate IT security policies and ensure that such policies address all relevant risks.

### **Business Continuity Planning :**

It may be restated that IT systems have now become critical to an organisation's functioning and continued availability of these systems is essential to the achievement of organisational objectives and realisation of benefits. Simultaneously it needs to be recognised that IT systems are specially vulnerable to disruption and disasters. Business continuity planning is about planning to recover key business processes following a disaster. Disasters not only refer to fires, floods etc. but also to strikes, power outages and system malfunctions. These plans should identify those activities that are critical to the auditee's business and provide for their continuation. This exercise would require

taking into account the relative importance of various systems using risk assessment techniques and plan how alternative computing facilities are to be provided. The type and costs of alternatives will depend on the estimates of maximum times for which sub-systems can remain down. Since implementation of components of such plans have costs related to them such plans should be appropriate and be cost effective. Plans should be tested regularly to ensure that they are practicable and that users understand them.

Auditors should see if organisations have a documented business continuity plan and see if this has been tested and found to be workable.

## **CONCLUSION AND ISSUES FOR COUNTRY PAPERS**

The general approach in this paper in auditing Government Business driven IT investments has been to relate performance of IT systems, created using such investments, to adoption of standards and best practises in deploying IT methods. The methods refer to both management and maintenance of IT Investments. Auditors evaluating performance of IT systems may come across many systems failing or under performing for the same reasons. This points at a systematic control failure and is evidence of weak policies, standards and management. In case failures of particular systems are being examined investigations should concentrate on validating the auditee's policies, standards and practises to ensure that these are appropriate and on the adverse impact of deviation from best practise.

*The audit of the "Comprehensive Computerisation programme" of the Income-tax department revealed several evidences of underperformance. Some of these are:*

- *Compared to budget estimates for the project over a period of 5 years of Rs.340 million, the revised budget figures were Rs.1246 million against which Rs. 1054 million had been actually spent. Hence the project experienced considerable cost overruns.*

- *The project , started in 1994, cannot be said to be complete even after 6 years . None of the project milestones for procurement, installation and operation of the software, hardware, networking and training could be achieved. In fact delays were considerable in key areas which held up progress in all areas of the programme.*
- *Several cases of wasteful and irregular expenditure were found in audit.*
- *Consequent to the above none of the benefits from the considerable investment made in this project could be realised even 6 years after the project was started and the department is still far from the objective of "improving the efficiency and effectiveness of Direct Taxes administration".*

This paper seeks the following responses from country papers:

- Does your SAI recognise the links between performance of IT systems and adoption of standards and best practises relating to various methods for management and maintenance of IT investments.
- While dealing with various elements of management and maintenance of IT investments areas that should concern the auditor have been highlighted. Do SAIs consider these concerns to be adequate and valid.Can additional concerns be identified.
- SAIs are requested to highlight instances, noticed in actual audits done by them,where failures and underperformance have resulted out of inadequate statement of best practises by auditees and also out of deviations from best practises.