

## CHAPTER: 5 REVIEWS ON IT AUDIT

### Indian Oil Corporation Limited

### Re-engineering Project (Manthan)

#### *Highlights*

The Company failed to evolve a long range plan and strategy, duly documented with performance indicators and targets.

*(Para 5.1.4)*

The Company could not develop adequate in-house expertise even after implementation of 99 sites as per their plan. The rollout beyond 99 sites was assigned to five outside consultants entailing an additional and avoidable expenditure of Rs.9.56 crore.

*(Para 5.1.4)*

An exclusive Committee to monitor all aspects of 'Manthan', the IT re-engineering project, which impacts all aspects of the functioning of the Company, was absent for most part of the project.

*(Para 5.1.5)*

Heavy reliance was placed on the consultant firm, which was appointed after inviting limited tender. Extra payment of Rs.33.27 lakh was made to the Consultants for selection of Enterprise Resource Planning software and vendor, which was not in the work scope of the Consultants.

*(Para 5.1.6)*

Non-synchronisation of various phases of project resulted in a delay of over two years from September 2002 to November 2004 in completion of the project and the Company could not derive the projected benefits of Rs.358 crore per annum from on-line integrated business processes and optimisation in Supply Chain Management.

*(Para 5.1.6)*

Appointment of vendor for delivery of add-ons software packages was done without inviting global tender. The bid was finalised after a delay of 25 months in evaluation of techno commercial bid, waiving important tender conditions.

*(Para 5.1.8)*

The Company had not been able to identify any tangible benefits of the project till now.

*(Para 5.1.9)*

The Company failed to identify and allocate Rs.20.32 crore as the cost of manpower deployed from various divisions towards implementation of the IT re-engineering initiative.

*(Para 5.1.9)*

The Company had not effectively communicated the IT roadmap to all levels of the organisation. It had also not been able to provide adequate training to all users for operating in the new technological environment.

*(Paras 5.1.11 and 5.1.13)*

The Company had failed to appreciate the possible risks of not keeping the off-site data back up at site(s) other than their Primary Data Centre before 'go-live' of sites. Instances of breakdown of leased links interrupting the business transactions occurred at sites, which were not put on the three tiers Communication Network.

*(Para 5.1.14)*

Primary Disaster Recovery Centre within the same premises as of Primary Data Centre, exposed it to the same immediate risks of physical disaster. Site selection of Alternate Disaster Recovery Centre also did not take into account all the threats to the centre.

*(Para 5.1.14)*

Non-configuration of all 'As Is' and 'To Be' business processes into SAP. Although the processes continued to be in business operations, their non-incorporation in the ERP Software had resulted in gaps in the functionalities provided by SAP and the business processes.

*(Para 5.1.17)*

Adequate sign-off procedures were not followed by the Company at the time of 'go-live' of SAP which resulted in uploading the data without purification. This was confirmed when Audit noticed that data in respect of lube inventory was not correctly uploaded at depot at Ajmer in December 2003 which resulted in difference of Rs.2.63 crore (May 2004) in the physical inventory and stock as per SAP.

*(Paras 5.1.23 and 5.1.36)*

Data loaded on SAP was authorised only by the Middle Management and not by Head of Department of the site.

*(Para 5.1.36)*

The Management had not instituted any system of regular reviews for ensuring the fulfilment of the quality assurance commitments made contractually by the Consultants, vendors and suppliers of annual maintenance services.

*(Para 5.1.45)*

Neither the evaluation of compliance and performance of the Availability Plan had been conducted by the Internal Audit Department of the Company nor was any post implementation review of the Availability Plan conducted by outside agencies.

*(Para 5.1.45)*

None of the Critical Success Factors had been achieved despite implementation of SAP at 292 sites (March 2004).

*(Para 5.1.45)*

### **5.1.1 Introduction**

The Indian Oil Corporation Limited. (Company) has an annual turnover of Rs.1,30,203 crore (2003-04) and commands 51 per cent share of petro product market of all the PSUs of the country. Its operational infrastructure consists of 10 refineries having 7,575 kms of pipeline and marketing network of 22,465 retail outlets.

In 1996 the Company felt a need for IT\* re-engineering as it observed that over the years several need based modules were developed leading to creation of islands of information which lacked integration across the Company. Towards this the Company appointed M/s Price Waterhouse Associates (PWA) (April 1997) after limited tendering as Consultants to the IT re-engineering project (Manthan). The scope of the project broadly included developing a corporate IT strategy, formulation of design parameters for core integration of functional modules to be used at all the units of the Company from Board room to the refineries and upcountry sales offices, developing the required system architecture, determining the needs for upgradation and addition of hardware and software, integrating the existing modules as well as new modules and standardisation and implementation of the integrated system across the Company. The project was to be carried out in four stages, namely, Conceptualisation and Design, Development and debugging, Trial Implementation and Stabilisation and Standardisation. The project was to be completed in 29 months (i.e. September 1999).

Under the project, the Company, on the advice of the Consultants, selected SAP\*/R3 along with the associated oil and gas specific software IS-OIL and CIN as the ERP\* solution for customisation and implementation across the Company, integrating important functions such as Finance and Controlling, Human Resources, Production Planning, Sale and Distribution, Material Management, Plant Maintenance, Project System and Quality Management. This was to be supplemented with 'add-ons' i.e. additional software solutions, which could be seamlessly integrated into the ERP environment. The 'add-ons' addressed vital functions such as demand forecasting, distribution planning, crude selection and refinery planning.

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\**Information Technology.*

\**Systeme, Anwendungen, Produkte in der Datenverarbeitung which, translated into English, means Systems, Applications, Products in data processing.*

\**Enterprise Resource Planning- refer to Annexure 13*

The Company had implemented (March 2004) SAP/R3 at 292 out of 530<sup>♥</sup> sites scheduled to be completed by September 2002 (as per the initial targets) at a cost of Rs.182 crore (against the initial estimate of Rs.95.95 crore including hardware software and consultancy). The 'add-ons' were still at various stages of implementation as detailed in paragraph 5.1.6 below.

### ***5.1.2 Audit scope and methodology***

In order to assess the IT governance framework and to evaluate various components of planning and execution of such a large IT project, Audit felt a necessity to benchmark the processes with globally accepted frameworks. Accordingly, COBIT<sup>\*</sup> was chosen as the standard frame of reference. Details about COBIT and Audit methodology are given in Annexures 10, 11 and 12.

The audit was conducted between August 2003 and June 2004 at 25 sites and at the Corporate IT System Department. Detailed audit findings for each of the four domains are given in succeeding paragraphs.

### ***5.1.3 Planning and organisation***

Audit assessed whether the Company's planning and strategy were aligned to ensure that contribution of IT was aligned with the achievement of the business objectives and whether the strategic vision was planned, communicated and managed for optimum results.

### ***5.1.4 Defining a strategic IT plan***

The Audit objective was to seek assurance that there existed a strategic IT plan to strike an optimum balance of IT opportunities and IT business requirements as well as ensuring its further accomplishment. However, Audit found an absence of enterprise oriented, documented IT long range strategic and short range implementation plan.

Till 1996, IT was implemented by the Company on an 'as needed' basis in response to specific business requirements and IT development was decentralised at the divisional level rather. This resulted in the development of a variety of need-based modules leading to 'islands of information' lacking on-line integration with all the business functionalities across the Company and technological gap in areas like software development and networking infrastructure.

The job of analysing the business requirements of the existing available technology and the benefits which would be derived from ERP Software implementation was assigned by the Company (June 1997) to the Consultants (PWA), at a cost of Rs.30.42 crore. The Consultants were appointed without resorting to global tender and since then had a major influence in aspects like selection of ERP vendor, add-ons vendor etc, which were not in their initially given mandate.

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<sup>♥</sup>*Reduced to 429 sites (June 2004).*

<sup>\*</sup>*Control Objectives for Information and related Technology.*

PWA developed a Conceptual Technology Plan (CTP) for the IT re-engineering project. Though the CTP set forth strategies for various aspects of IT architecture that needed to be closely aligned with the requirements for implementation in the target areas, it was essentially a Project-oriented Plan. Though the CTP did address the functional and operational requirements including performance, safety, reliability, compatibility, security and legislation of ERP Solution (SAP/R3) the Company failed to evolve a long range strategy and plan, duly documented with performance indicators and targets.

For the on-going process of identifying future trends and regulatory conditions relating to IT development the Company placed heavy reliance on the Consultants, without a corresponding emphasis on the development of in-house expertise, to ensure continuation of the IT re-engineering efforts and future direction. This is clearly shown by the fact that the rollout beyond 99 sites was assigned to five consultants entailing an additional and avoidable expenditure of Rs.9.56 crore though the Board had decided (March 1997) that the task of 'go-live' beyond 99 sites (including 22 pilot sites) would necessarily be done by the in-house trained engineers.

The Company replied (January 2005) that, keeping in view the target date of rolling out of the software at 330 locations, the expenditure of Rs.9.56 crore was incurred towards appointment of five consultants. At approximately 90 locations in-house resources were deployed exclusively for rollout.

The reply is not tenable as approval of Rs.9.56 crore was necessitated due to non-development of adequate in-house expertise and non implementation of SAP at 99 sites within 29 months from the date of approval for the appointment of Consultants as envisaged.

#### ***5.1.5 Inadequate system for the monitoring and evaluation of IT plans***

Audit observed that the Steering Committee constituted in 1996, for the evaluation of Manthan and the status of the Project, held only four meetings over a period of seven years (1996-97 to 2003-04). The last meeting of the Steering Committee was held on 30 March 2000 after which the Committee was discontinued. From February 2000 the monthly progress report of Manthan was being placed before the Corporate Management Committee (a Committee constituted for the evaluation of all corporate projects). Thus, it is seen that an exclusive committee to oversee all aspects of Manthan, IT re-engineering project which would impact all aspects of the functioning of the Company, was absent for most part of the project. This led to delays in implementation and deficiencies in various processes remaining undetected, causing delay of two and a half years and denial of expected benefits of Rs.358 crore per annum as described later.

The Management stated in their reply (January 2005) that a system to place the monthly progress report of Manthan Project before the Corporate Management Committee had commenced from August 1999 and a designated core group headed by the Executive Director monitored the progress of the project. It also stated that presentations on the progress of the project were made to the full Board, Audit Committee of the Board,

Project Evaluation Committee of the Board as well as Executive Committee of the Board.

The reply of the Management is not acceptable as the Corporate Management Committee was on no occasion convened specifically to review the progress of Manthan Project. The monthly progress of the Manthan Project was reported along with those on other projects in the Company. Moreover, the status reports were placed only sporadically before the various committees.

During Audit it was also seen that the Management had decided (June 2004) to reduce SAP implementation from duly identified 530 sites to 429 sites due to non-availability of Leased Line Links and other technical problems. Since the Management had not comprehensively deliberated the issues involved in SAP implementation, the benefits that were originally envisaged on implementation of SAP at all the identified sites, could not be availed of. Alternatively, the plan should have duly been developed after addressing the key issues, requirements and foreseeable limitations, if any, regarding the number and location of actual sites that were to be identified in order to have a realistic perspective plan for the Company, duly encompassing the scope and coverage of the IT re-engineering project.

#### **5.1.6 Project management**

Audit aimed at finding whether the processes satisfied the requirement of setting priorities and delivering the project on time and within budget.

Audit observed that frequent modifications and non-adherence to the time-schedule originally envisaged, resulted in the denial of the projected benefits of Rs.358 crore per annum from on-line integrated business processes and optimisation in Supply Chain Management as detailed below:

The Company, while making a business case for implementing the IT re-engineering initiative, projected a benefit of Rs.358 crore per annum due to implementation of ERP and Rs.215 crore per annum due to implementation of add-ons. This benefit was supposed to flow after implementation of the project from (i) inventory optimisation (Rs.147 crore), (ii) reduction in transportation expenses (Rs.70 crore), (iii) saving in banking cash (Rs.33 crore), (iv) reduction in demurrage costs (Rs.31 crore), (v) discount through accounts payable management (Rs. 30 crore), (vi) reduction in cheque holding time (Rs.15 crore), (vii) reduction in accounts receivable (Rs.12 crore), (viii) reduction in time overrun in project implementation (Rs.11 crore) and (ix) reduction in communication expenses (Rs.9 crore). The benefits from 'add-ons' were expected to flow from crude mix optimisation (Rs.115 crore) and yield improvement in refineries (Rs.100 crore).

The position of target dates and actual dates of completion are given in Annexure 14.

From the Annexure 14 it is evident that there was a delay of 30 months apart from extra time of 14 months (July 1998 to September 1999) taken for selection of software/software vendor which was not provided in the project schedule. This resulted in denial of projected benefits of Rs.358 crore on a yearly recurring basis as stated in the cost-benefit analysis submitted to the Board (July 1998). This delay in ERP implementation also caused a delay in the implementation of 'add-ons'.

It was also observed by Audit that the Management had revised the implementation schedule for the Project due to delay in the selection of ERP Software (SAP/R3) although its procurement was required to be synchronised with the completion of Stage I by the Consultants. Moreover, the task of selection of ERP was subsequently entrusted to the Consultants, at a further cost of Rs.33.27 lakh and the scope of the work, thus, stood modified.

It was further observed in Audit that as per the terms of the purchase order (August 1999), the vendor was to supply the software SAP/R3, within 30 days which had to be extended subsequently to 75 days from the date of receipt of the purchase order.

The Management stated (April 2001) that the delay in the supply of software was due to non-finalisation of the contractual and legal issues. The Management further replied (January 2005) that the total delay in implementation of the project was only six/seven months, hence it could not be concluded that the organisation had lost Rs.358 crore on yearly recurring basis for a much longer period as a result of delay in implementation of ERP.

This reply of the Management is not borne out by facts as the delay, when calculated by comparing the final target date with the actual implementation date, as shown in the table, was 30 months for ERP implementation and seven months for implementation of 'add-ons' (Phase-I).

#### ***5.1.7 Non-synchronisation of different items of conceptual technological plan/work plan***

Audit revealed that there were deficiencies in synchronisation of various stages of the CTP implementation as neither the completion of the Local Disaster Recovery Centre (DRC) nor that of the alternative Disaster Recovery Centre at Sanganer (Jaipur) was synchronised with 'go-live' plan of SAP/R3. In a highly centralised ERP environment non-availability of alternate offsite DRC is an unacceptable operational risk.

#### ***5.1.8 Managing IT investment***

The Audit objective was to see whether a system was in place to ensure that funding and control over financial resources was adequate.

The project estimates (including software, hardware and consultancy costs) of Rs.95.95 crore in March 1997 escalated to Rs.273 crore in September 2002; Rs.182 crore had been spent on the project (March 2004).

Limited tenders were issued (September 2000), based on the recommendation of the Consultants (PWA), to only three parties (M/s. Tata Honeywell, M/s. Aspentech Inc and M/s. Invensys India Private Limited). The Company took 25 months to finalise the tender (October 2002) and waived three important terms and conditions of the General Conditions of Contract (GCC) in the selection of 'add-ons' viz. condition of visiting the sites of vendors by Company representatives, users' feedback of projects implemented by the vendors and submission of 100 per cent bank guarantee (The Company accepted 50 per cent bank guarantee including 10 per cent performance guarantee). The Company, thus, failed to avail the benefits of competitive bidding. It was also not clear how the Management assured itself of the suitability of the vendors for such a critical and costly project without observing important conditions as described above. The Management also failed to hedge the risk by waiving the condition of 100 per cent bank guarantee. No justification for the waiver of the terms and conditions of GCC was on record.

The Management stated (January 2005) that all such software solutions needed a critical review of the functionalities offered. Out of the three vendors, two of the vendors had their Headquarters outside India and, therefore, required constant interaction with their principals for any deviation in the contract conditions required to be finalised with the Company. They had finalised the tender in the optimum time for finalising such a gigantic Supply Chain Management project of the Company.

The Management reply is not acceptable to the extent that the recommendation of the Consultants for the limited tender to three vendors deprived the Company of the benefits of competitive market in the field of Supply Chain Management System suppliers. The Company took more than two years in the finalisation of techno-commercial bids and finally accepted the deviations after waiving important tender stipulations.

#### **5.1.9 Cost benefit monitoring**

Audit observed that after commencement of implementation of ERP there was no effective system in position to regularly monitor, by benchmarking performance with predefined performance indicators, the evaluation of the realisation of both tangible (like inventory optimisation and reduction in transportation expenses as discussed in paragraph 5.1.6 above) and intangible benefits (reduction in lead time and improved customer service, warehouse management expected to reduce the book and physical stock discrepancies and tracking of complete history of each product to assist in trouble shooting) that were anticipated and realised on a project of such magnitude and investment outlay.

The Management stated (January 2005) that though there was a well defined cost monitoring process to compare the actual expenditure/commitments vis-à-vis the budgetary amounts in the organisation, the quantified tangible benefits accruing from the implementation of ERP could be determined for the entire organisation once the system was operational for at least six months at all units of the organisation; the intangible benefits such as uniform coding structure for material master, unique customer code, unique vendor/service providers code, common chart of accounts, centralised price update and a robust communications system had already accrued to the organisation.

The reply of the Company is untenable in view of the following:

(i) Though by April 2004 in three out of four divisions (Refineries, Pipelines and Research and development) Manthan had been implemented, the Company, in the absence of predefined performance indicators, could not even identify, let alone have a preliminary qualitative assessment of, the tangible benefits even though more than six months had passed after the implementation in these divisions;

(ii) The reply of the Company also does not address the key and fundamental benefits that would accrue in terms of improved visibility of information, leading the way towards enterprise transformation and evolution of performance indicators for measuring and regularly evaluating the Return on Investment;

(iii) The intangible benefits quoted by the Management are 'To Be' processes and not benefits;

(iv) As regards the robust communication system, the same is to be viewed as a fundamental pre-requisite for the effective functioning of the centralised architecture and not as a benefit of IT re-engineering efforts.

It was also observed during audit that the Company failed to identify and allocate Rs.20.32 crore as the cost of manpower deployed from various divisions towards implementation of the IT re-engineering initiative. Proper apportionment of identified costs for a project is necessary for post implementation cost benefit study.

#### ***5.1.10 Communication of Management aims and directions***

The objective of audit was to seek assurance that processes existed to ensure user awareness and understanding of the Management aims and directions.

#### ***5.1.11 Absence of continuous communication program and checking compliance***

It was observed during Audit that:

❖ There was no effective plan in position to communicate the IT Roadmap and IT Vision to all levels of the organisation. Though the Corporate Vision was communicated to officers upto the Middle Management level, the IT Strategic Planning was not communicated to all levels of Management and users. It remained confined to the higher echelons of Management (members of Steering Committee and Review Committee and the Heads of Divisions);

❖ In the absence of any documented IT Implementation Plan, the task of communicating, involving, mobilising and educating the users regarding the new capabilities available in the technological environment did not take place. Further, even the decisions of the Top Management and the Work Plan of the Consultants were not communicated to the users across the various functional divisions of the Company.

The Management stated (January 2005) that the IT plan as well as progress of implementation was continuously communicated across the organisation by hosting the information about implementation progress of the project on the intranets of the organisation and also through the Manthan Infokits circulated in the organisation.

The reply is not tenable because the measures taken such as disseminating information on intranet and Manthan Infokits etc. by the organisation did not seem to be sufficient to address the specific requirements of end users since it was observed during the audit of 25 units where SAP was implemented, that users at different levels including the end users in most of the units, had no communication about the IT vision and IT plans of the Company.

#### **5.1.12 Management of human resources**

Audit assessed whether the Management had been able to maintain a motivated and competent workforce and impart training in a structured manner.

#### **5.1.13 Insufficiency of IT trained staff and absence of regular IT training of users**

Based on the identified needs, the Management should define the target groups, identify and appoint trainers, and organise timely training sessions. A training curriculum for each group of employees should be established and training alternatives should also be investigated (internal or external site, in-house trainers or third-party trainers, etc.). This is especially true of implementation of ERP projects where IT re-engineering is closely aligned with business processes re-engineering.

However, in Audit it was observed that the Company did not have a formal, documented detailed training plan for its employees. As a result the capabilities and familiarity with the new system varied widely.

The Management stated (February 2004) that initially Consultants gave training to the core team (BASIS Group) and thereafter the core team provided on-site training to the users at the time of implementation of SAP. But during audit it was found that the training was inadequate and was not according to training courses prepared by the Consultants. At the pilot sites the users, under different categories, were not imparted the requisite formal training for performing their daily business transactions in an optimal manner in the new technological environment. User feedback during the audit of 25 sites indicated that due to the absence of skill upgradation, through adequate training and awareness, the users at most of the units were not comfortable in the ERP environment (May 2004).

The Training Software costing Rs.1.06 crore was not used to impart training to the users. The organisation, thus, failed to comprehensively address the necessity for institutionalising education and training program focused on Corporate IT Systems in a manner that would ensure its strategic alignment with business processes. This hampered the efforts of the Company to get full benefits of the latest technology.

The Management, in its reply stated (January 2005) that the Corporation had adequate IT professionals to take care of the requirements in the organisation and a large number of users from the functional groups in the organisation had acquired technical skills to operate even the complicated SAP software. It was not correct to infer that formal training in relation to IT was confined to only the Information Systems group and large number of training programmes had been organised for end users, functional users and internal audit.

The reply of the Management is not tenable because the necessity to appoint five consultants, by paying them Rs.9.56 crore, to rollout the project beyond 99 sites shows that even after 65 months sufficient in-house skill was not generated. The training was actually imparted to personnel in functional group of Corporate Office (Information Systems Department). Hence, mobilisation and education of the end-users regarding the new capabilities available in the transitional environment did not take place. The Management also failed to furnish any document in support of their reply regarding utilisation of training software. Moreover, the user feedback, as found by Audit, indicated that the training was inadequate to equip the users for their designated roles.

#### ***5.1.14 Assessment of risks***

The Audit objective was to seek assurance that the Management had identified and implemented important decision factors to respond to actual or perceived threats.

Audit found that the onsite Disaster Recovery Centre (DRC) was located within the compound of the main processing centre though the consultants had suggested it to be located at least 10 kms away. Moreover, the alternate DRC was being constructed at Sanganer (Jaipur) 300 kms away. While the onsite location of DRC exposed it to the same immediate risks of physical disasters as the main processing centre, the alternate DRC, because of its geographical location, was also susceptible to strategic threats. The organisation clearly failed to comprehensively assess the risks to its operation in case of a physical disaster/threat.

The Management stated (January 2005) that the Company was well aware about the risk identification and impact analysis of any disaster and a four tier Risk Management System had already been instituted in the organisation and was being implemented in the organisation, commensurate with the number of sites going live.

The reply is not tenable. Though the Company had followed four tier Risk Management System as per recommendation of the Consultants (PWA), it had failed to appreciate the strategic significance of Remote Disaster Recovery Site at Jaipur which was approved in September 2002 but had not yet been commissioned (December 2004).

#### ***5.1.15 Acquisition and implementation***

Important aspects of organisation's acquisition and implementation plans and strategy regarding IT solutions are covered in this domain. Audit assessed whether the IT solutions identified, developed and acquired were adequately implemented and integrated into the business processes of the Company. This was done by examining:

- acquisition and maintenance procedures of application software and technological infrastructure,
- development of procedures for operation requirements and service levels and
- circulation of user procedures, operational and training manuals.

The domain is divided into high-level control objectives. The relevant audit findings are detailed below:

#### ***5.1.16 Acquisition and Maintenance of application software***

The Audit objective was to see whether the organisation was successful in acquiring and maintaining desired automated functions, which effectively supported the business processes.

Audit observed a number of deficiencies in the acquisition process of the application software, which are detailed below:

#### ***5.1.17 Non-configuration of all 'As Is' and 'To Be' business processes into SAP***

During the testing of the Finance and Controlling Module and the Human Resources Module, Audit observed that some of the 'As Is' processes had not been mapped and configured into the SAP Software as 'To Be' processes. Although the processes continued to be in operation, their non-incorporation in the ERP Software had resulted in gaps in the functionalities provided by SAP and the business processes. Moreover, it was observed that there was no structure within the SAP, which could enable comparison and analyses of which of the 'As Is' processes were omitted and which had been mapped and configured into 'To Be' processes.

#### ***5.1.18 Configuration of business processes***

Although business processes were configured and tested as per the documented Testing Strategy and Plans, Audit observed gaps and deviations, which are detailed below:

- Area Office, Chandigarh, was found not using the sub-modules such as-Receipt and Issue of Stationery, Subscription Vouchers (SVs) and Transfer Vouchers (TVs) Control and On-line Reconciliation of SVs and TVs. The Management stated (May 2004) that these processes, though provided for in SAP, were not practicable with the resources available at the Area Office. This shows the inadequacy of the training strategy of the Company.
- At Mathura Refinery and Pipeline Head Office, Noida, Project Monitoring was not being done through SAP (June 2004). The existing Software '*Primavera*' was being used for the purpose.
- At Mathura Refinery, sub-modules like previous employers details, property details; passbook details were not being used (June 2004).
- Plant Maintenance Module was not being used in the LPG Plants, Depots and Terminals. Instead existing Software was being used.
- The Human Resource Department of Mathura Refinery was using (June 2004) existing software '*Integrated System for Human Resource*' (*I-SHURE*) which had no interface with SAP. The Management stated (June 2004) that the Company was in the process of procuring and installing an additional software (access control system)

from M/s Tata Honeywell at a cost of Rs.25 crore, which was likely to be implemented by August 2004. This showed that all the needs of the Company were not mapped into the IT re-engineering efforts.

- Although interface between the users and the machine (Software, Hardware and Networking) had been established through training scripts, it was observed during Audit Evaluation and Testing of the SAP Modules implemented at various sites that the users had not been imparted training in the handling of software and hardware. Further, there was no procedure to impart cross-functional training and knowledge.
- It was observed during the audit of Ambala Terminal (May 2004) that there was no validation check on the date of Instrument (cheque, DD etc.) as the field properties were set as alpha numeric instead of date field. Further, Audit observed during testing that a cash receipt and bank deposit slip could be generated even for a post-dated cheque. Thus, the system had no validation check/control on the field, i.e., date of instrument. This had resulted in acceptance of both pre-dated and post-dated cheques.
- Testing of SAP implementation at the Panipat Refinery (pilot site) revealed that the end users dealing in bank deposit slips had encountered problems in customised sub-modules in the preparation of non-SBI deposit slips. This shows that process to differentiate between SBI cheques and non-SBI cheques were not defined and incorporated into the system.
- In a case at the Mathura Refinery Terminal it was found that a transport truck was loaded with material worth Rs.3.75 lakh although there was no balance at credit in the account of the party. This shows non-incorporation of proper validation check in the system.
- At the same Terminal, in another case, it was noticed that despite a party having deposited a sum of money towards the shipment of a product, the same could not be cleared, as there was no balance in the account of the Party. This shows no real time update of records in this case.
- It was also noticed that in the case of outstation cheques, outstation charges were not being debited to the concerned user accounts at Mathura Refinery Terminal (June 2004) immediately, thereby resulting in incorrect accounting. This shows that processes were not defined and incorporated in the system to identify outstation cheques and calculate charges accordingly.

The absence of adequate validation checks assumes considerable significance in a large on-line network system where iterative transactions could be voluminous, thereby adversely affecting the reliability of data generated by the system. The above illustrations also highlight the necessity for examination of the customisation process by obtaining feedback from the end users.

The Management accepted the specific observations listed above and stated (January 2005) that the System Design Reassessment for addressing the logical and technical discrepancies would be an on-going exercise and carried out by various functional teams at Corporate Office (Information System). It further stated that with the implementation

of SAP at various units and increasing awareness of the end users about the functionalities of various modules of the SAP, more and more end users would make use of these functional modules. The use of legacy and existing software was only a temporary phenomenon and would gradually phase out. As regards cross-functional training, the details of the software were known to the officers working in Corporate Office (Information Systems) who were only authorised to carry out any modification required by the end users.

The reply shows that instead of having a structured training plan to educate and train users for optimal utilisation of the system and ensure that there was no discrepancy between the technological capability of the workforce and the available functionality of the system, the Management had adopted a 'learn as you work' approach. This approach is unsuitable for such a large IT re-engineering project which not only brings in new technology but also seeks to change the existing ways of working of the organisation.

#### ***5.1.19 Porting of master data***

During the field audit of SAP implementation it was observed that Management had not communicated the Data Migration Strategy in the absence of which no sign-off of input data and migrated data could be done at the time of 'go-live'. On the date of implementation, the existing application software was terminated and the running data at the close of the day was uploaded onto the application and the transactions were commenced with the uploaded Master Data, treating the same as opening balances of the current transactions.

#### ***5.1.20 Source data without Audit trail***

It was also observed that at the time of 'go-live' of ERP, the closing balances of running transactions were frozen and uploaded into the application as the opening balances. Thus for tracing the source data, there was no Audit trail in existence and the user had to take recourse to the legacy system for the same.

The Management accepted (January 2005) that though the closing balances of transactions had been frozen and uploaded into ERP as the opening balances on the day of 'go-live', the Company was planning to collect the detailed transactions constituting those balances and replace the opening balances by the transactions. The exercise would be taken up after stabilisation of the system by 1 April 2005.

#### ***5.1.21 Development and maintenance procedures***

Audit assessed whether the Company had ensured proper use of the applications and the technological solutions put in place, by adequately circulating the various manuals.

Audit evaluation revealed that:

- Though the Users Procedure Manual had been documented and communicated through Intranet, the end user lacked awareness about the utilities of system software as the users had not been given adequate and regular training to operate the software. The Consultants at the time of implementation of SAP/R3 at a particular site gave

only awareness training which according to some users was not sufficient to understand the operational technicalities; User Operating Manual/Guidelines were only communicated to a limited group (Core-Group). As a result the end user lacked awareness about the utilities of system software. Similarly the documented Operation Guidelines/Manual, Quality Control Manual, System Security Controls and business requirements had not been adequately communicated for the benefit of the end users.

**5.1.22 *Installation and accreditation of the system***

The Audit objective was to seek assurance that the Management had verified and confirmed that the IT solution was fit for the intended business purposes of the organisation.

**5.1.23 *No sign-off of the SAP implementation and standardisation***

IT installation and accreditation of 'To Be' business processes in SAP/R3 Software was certified and signed-off only by the Process Owners and Core-group responsible for software implementation. The Management stated (June 2004) that the signing off of the completion of ERP Implementation by the Consultants (PWA) and standardisation certification from them had not yet been obtained.

**5.1.24 *No parallel run of the existing system***

It was observed that no parallel run was conducted at any site after ERP implementation. In the absence of a parallel run, performance analysis and critical evaluation of the new system as against the existing system could not be done.

**5.1.25 *Record of baseline configuration was missing in SAP/R3***

It is necessary to ensure that a record of baseline configuration items is kept as a checkpoint to return to, after changes. Although the baseline configuration had been preserved as 'As Is' process these were not mapped into SAP/R3. Thus, for changes after go-live, the user had to revert to Manuals of 'As Is' business processes which was time-consuming and also defeated the purpose of an Online Information System.

**5.1.26 *Delivery and Support***

This domain essentially addresses the aspects relating to the actual delivery of the required services like traditional security operations, system security and maintenance of business continuity. Audit examined whether the services and support processes had been properly designed and implemented by the organisation to ensure the same.

The domain is divided into high-level control objectives. The relevant Audit findings are detailed below.

**5.1.27 *Management of third party services***

The Audit objective was to see whether implementation was done according to the agreed terms and conditions with the third party service providers.

**5.1.28 *Extra payment to SAP India for AMC due to defective planning***

It was observed in Audit that the free maintenance services for SAP software were valid for a period of 12 months commencing from 1 October 1999 and thereafter the software was covered for preventive maintenance under an AMC\*, for which the Company paid an amount of Rs.4.85 crore for a two-year period commencing from 1 October 2000. However, implementation of the first go-live was on 1 August 2001.

The above sequence reflects the absence of effective planning and synchronisation, resulting in the denial of benefits including those resulting from coverage through free maintenance service, which were to accrue to the Company through ERP.

The Management stated (January 2005) that during the AMC vendors upgraded the version of software and gave online support services. Hence it was wrong to say that there was absence of effective planning and synchronisation in the software procurement, customisation and implementation.

The reply is not acceptable. Had the ERP been implemented at 99 sites timely by 30 September 1999 it could have been covered under free maintenance period (1 October 1999 to 30 September 2000). The Company paid Rs.4.85 crore for maintenance contract for two years upto September 2002 when only 16 sites had been covered under ERP. Thus the payment was made for underutilised maintenance services.

**5.1.29 *Management of performance and capacity***

The Audit objective was to see whether optimal use was made of the internal reporting processes. It was observed in Audit that though the Management had developed a system of users' feedback to take corrective action, no record of rectifications made was kept for future reference. In the absence of the required documentation of action taken on the feedback, the system improvement objective was limited.

**5.1.30 *No development of trend analysis and reporting system***

The reports with regard to customer queries were to be adequately analysed and acted upon and trends were to be identified. During the audit it was observed that no procedure was in place to assure adequate reporting with regard to customer queries and resolution, response times and trend identification. Thus, one very important benefit of an ERP solution was not being availed of.

**5.1.31 *Ensuring continuous service***

The objective of Audit was to seek assurance that systems were in place that made sure that IT services were available as required and there was minimal business impact in the event of a major disruption. To have an effective Continuity Plan the Management should provide for Continuity Plan Maintenance procedures aligned with Change Management and Human Resources procedures and needs to have regular testing of the plan. Audit, however, observed that since the Disaster Recovery Plan had not yet been fully

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\*Annual Maintenance Contract

implemented, the integrity of Continuity Plan including testing and its maintenance could not be determined. It also observed that neither the local DRC nor the alternative DRC at Sanganer (Jaipur) was synchronised with 'go-live' Plan of the ERP solution. Though the Board decided (July 1998) to implement Disaster Recovery Plan by duplicating the servers at a suitable site duly interconnected in order to have safe arrangement in the event of untoward incident at the central site the approval was sought only after four years in July 2002. The alternative DRC at Sanganer (Jaipur) was still under construction (June 2004). In a highly centralised ERP environment non-availability of alternate offsite DRC for a Company, which plays an important role in national defence preparedness, poses a very high and unacceptable risk. This assumes even greater importance as the project had already gone live and the Company had dispensed with the legacy systems without maintaining offsite back-up storage. This aspect is to be viewed in the context of the Company having already faced a recovery problem during a major breakdown at their Data Centre in Gurgaon, in August 2002, which highlighted the need for off-site storage.

The Management stated (January 2005) that the Metro Disaster Site at Gurgaon, which was under implementation during August 2002 i.e. at the time of major breakdown of the Data Centre, was fully commissioned only by November 2002. The malfunctioning of the system happened due to logical error and reversion to stand-alone systems at units (legacy system). A part of Business Continuity Plan was resorted to, to meet this exigency.

The reply of the Management shows that the Company only had an onsite DRC, as of now, which faced the same physical threats as the main servers and in no way obviated the threat to the Company's operation. The Company had also faced hardware and networking failure for 48 hours in August 2002 when the transactions in critical business divisions were switched over to legacy system. Similarly, another breakdown occurred at marketing terminal at Bijwasan on 26 and 27 September 2003 when the legacy system was brought back to conduct the business of the terminal.

#### **5.1.32 Ensuring system security**

The Audit objective was to see whether the organisation had a plan to safeguard information against unauthorised use, disclosure or modification, damage or loss.

Audit observed that though the project had already gone live and become operational, the Company had not yet documented an IT Security Policy. Since, the Management was still in the process of preparing the IT Security Policy, the assessment of the impact of implementation and monitoring of IT plan on the business requirements of the Company could not be evaluated.

At the Ajmer Depot, the users were found doing multiple jobs by sharing of passwords with one another; users in the Supply and Delivery Department were found using the password of the Depot Manager.

It was also found that though the Management had developed a system of communication of incidents of security lapse/errors and response by the BASIS Group through email, the e-mail boxes were emptied regularly both by the users and the members of the BASIS Group. Consequently there was no record of incident handling which could be used as

input/feedback for future developments for trouble-shooting. The system of taking corrective action through e-mail without keeping a record would deprive the Management of deriving the benefits of past experience in trouble-shooting.

#### **5.1.33 Management of problems and incidents**

The Audit objective was to identify processes to resolve problems and investigation of the causes to avoid recurrences.

#### **5.1.34 Problem tracking and Audit trail**

It was observed that there was no system of problem tracking and therefore no Audit Trail could be established in the absence of a Problem Management System whereby the record of all the operational events are kept. Consequently, all operational events such as incidents, problems and errors that were not part of the standard operation were not recorded and analysed in a timely manner.

#### **5.1.35 Management of data**

The Audit objective was to find whether the Company had controls in place to ensure that data remained complete, accurate and valid.

#### **5.1.36 Source document uploaded without proper checking and authorisation in SAP**

It was observed during Audit that the data loaded on SAP was authorised only by the Middle Management and not by Head of Department of the site. This poses the risk of inaccurate data being posted into the system. For example, Audit found that data in respect of lube inventory was not correctly uploaded in December 2003, at the Ajmer Depot, resulting in discrepancies amounting to Rs.2.63 crore between the physical stock and the stock as per the application. The problem remained unresolved (May 2004). Thus the Management had failed to follow appropriate Data Migration Procedures to ensure the integrity of the input data at the time of 'go-live'.

#### **5.1.37 No archiving policy**

The Management should implement policy and procedures for ensuring that archive meets legal and business requirements. Audit observed that though the Consultants (PWA) recommended that the data should be archived on a regular basis at milestone points, each time when there was a change to the system and when an upgrade for the software was released, the Company had not developed any policy regarding archiving of data.

In the absence of archiving and documentation thereof, the preservation of data for the purposes stated above, in respect of critical business processes could not be ensured. Accessing of significant data could, thus, become a time-consuming exercise without any certainty regarding its availability.

**5.1.38 *The management of operations***

The Audit objective was to see whether processes existed which would ensure that IT support functions were performed regularly and in an orderly fashion.

Audit of locations revealed that instructions of what to do, when to do and in what order, were neither documented nor communicated to users. Thus, IT support operations were informal and intuitive and there was high dependence on the skills and abilities of individuals.

**5.1.39 *Monitoring***

This domain essentially addresses the Management oversight of the organisation's control processes for providing assurance on the system. Audit reviewed the adequacy of the monitoring processes and how much these had been successful in continuous improvement of the system.

The domain is divided into high-level control objectives. The relevant audit findings are detailed below: -

**5.1.40 *Monitoring of the process***

The Audit objective was to identify processes which ensure the achievement of performance objectives set for the IT processes.

**5.1.41 *Absence of reporting to Senior Management for decision making***

There was a need to submit status reports to Senior Management regarding achievement of planned objectives, deliverables obtained, meeting of performance targets etc and any such information as may be required by the Senior Management for monitoring and review regarding the progress made towards achievement of the identified goals. Such reports could greatly facilitate Management in initiating timely action and controlling the effective progress of the Project.

However, Audit found that Business Warehousing and portal for Management Reporting as recommended by the Consultants had not been installed (June 2004). In the absence of the same, Management reporting through SAP was virtually absent. Though basic measurements to be monitored had been identified and assessment methods and techniques had been defined, the processes had not been adopted across the entire organisation and decisions were made based on the expertise of a few individuals.

**5.1.42 *Assessment of Internal Control adequacy***

The Audit objective was to seek processes, which ensure the achievement of the internal control objectives.

**5.1.43 *No document on Management reporting on Internal Control***

During the audit it was observed that there was no document on Management Reporting on Internal Control. There was no system of cross checking of the authenticity and

accuracy of business transactions executed in the new IT environment. The performance monitoring scripts that contained the corrective action parameters were also not examined by the Technological heads.

**5.1.44 No Independent Audit of operational security and internal control assurances**

Operational security and internal control assurance should be established and periodically repeated, with self-assessment or independent audit to examine whether or not the security and internal controls are operating according to the stated or implied security and internal control requirements.

It was observed during audit that the Operational Security and Internal Control Assurance were neither subjected to self-assessment nor to Independent Audit in order to examine whether or not the security and internal controls were effective and operating according to the stated or implied security and internal control requirements. Thus, there was a need for assessment of the adequacy of internal control mechanisms and institutionalisation of suitable systems and for the generation of Exception Reports for taking necessary corrective action.

**5.1.45 Obtaining independent assurance**

The Audit objective was to see whether the organisation obtained independent assurance to increase confidence and trust amongst the organisation, customers and third party procedures.

It was observed during audit that the Management had not carried out any independent certifications and accreditation for effectiveness evaluation. There was no independent assurance of compliance with laws, regulatory requirements and contractual commitments. No third-party service provider review and benchmarking was carried out. In the absence of the above, it would be difficult to instill confidence and derive assurance both from within the organisation and amongst customers and third-party service providers, that IT services duly addressed and satisfied the business requirement.

IT Management should also seek internal audit involvement in a proactive manner before finalising IT services solutions. It was observed during Audit that Internal Audit Department of the Company was not involved in the IT Re-engineering Project (Manthan) and there was no proactive Internal Audit involvement prior to the finalisation of IT services and during the implementation. It was also observed that none of the critical success factors had been achieved despite implementation of SAP/R3 at 292 sites (Total 530 sites subsequently revised to 429 sites) and there was no involvement of internal audit in monitoring the critical success factors brought out in the 'Availability Plan'. Moreover, no 'Post Implementation Review' was conducted by any external agencies for these critical success factors. This was indicative of weaknesses in monitoring of performance indicators.

Executive Director (Optimisation) of the Company stated (January 2004) that the Company was in the process of development of IT System, which would help the Internal Audit Department to conduct the Audit of IT System. The Management further stated (January 2005) that once the system was configured, total involvement of the Internal

Audit Department to study the system configuration, customised to generate various reports, was ensured from early 2002 and Internal Audit Department had been carrying out audit of the configured system and providing their observations on the system configured and implemented.

However, no report of the Internal Audit Department was made available to Audit (January 2005).

The Management in their reply (January 2005) had no comments to offer in respect of observations in paragraphs 5.1.19, 5.1.23, 5.1.24, 5.1.25, 5.1.29, 5.1.32, 5.1.34, 5.1.36, 5.1.37, 5.1.38, 5.1.41, 5.1.43 and 5.1.44.

#### ***5.1.46 Conclusion and recommendation***

The Company, which decided to implement ERP solution, a state of the art technology, towards its IT re-engineering efforts and spent vast sums of money had failed to get full benefits of the system. This was a result of deficiencies in planning, monitoring, training and communication of the Company's vision to all levels of the organisation, which led to delays, reliance on outside experts and lacunae in integration and implementation of the project. The Company also failed to comprehensively assess the risks and frame an effective mitigation strategy for the same.

The system is working because of the expertise and involvement of individuals but improvements were not ingrained into all the relevant processes of the organisation as a whole.

In order to complete all aspects of the re-engineering effort and exploit the full potential of the technology, the Company needs to focus on areas such as training, monitoring the processes and taking and analysing user feedback to plan and improve processes.

The Review was issued to the Ministry in January 2005; its reply was awaited (March 2005).

