

**MINISTRY OF PETROLEUM AND NATURAL GAS**

**Chapter: VI**

**GAIL (India) Limited**

**Material Management, Sales and Distribution, Human Resource and Project System modules of ERP System**

**Highlights**

The Company had not fully mapped its natural gas and telecommunication businesses in the Sales and Distribution module.

**(Para 6.6.1(i))**

The Project System module was not being utilised for the basic functions of Project scheduling and monitoring and instead, the Company continued to use legacy package.

**(Para 6.6.1(ii))**

Non-customisation of system for calculation of liquidated damages, warranty features and interest on delayed payments resulted in dependence on manual system.

**(Para 6.6.2.4(i), (iv) and 6.6.3.1(ii))**

Lack of input controls and validation checks in customer credit management and house building advance reporting resulted in manual intervention.

**(Para 6.6.3.2 and 6.6.4.1)**

A full fledged disaster recovery centre was not set up even after two years of SAP implementation.

**(Para 6.7.1)**

**6.1 Introduction**

GAIL (India) Limited (Company) was incorporated in 1984 as a principal gas transmission and marketing company of India and has since expanded its activities into gas processing, petrochemicals, and telecommunications.

The computerisation in the Company began in 1986 with the installation of minicomputers and implementation of in-house developed payroll and financial accounting systems. As recommended by the consultant M/s Arthur Anderson (presently known as M/s Accenture) SAP was found to be the best ERP to meet the Company's requirements. The Board of Directors (Board), however, after a lapse of four years approved SAP-ERP project in 2002 with revalidated recommendation from the same consultant at an estimated cost of Rs.55 crore. The SAP implementation work was awarded to M/s IBM in November 2003 with a scheduled completion by December 2005. The project was completed in August 2005 at a cost of Rs.63.98 crore.

The implementation of ERP aimed to:

- Enable GAIL to leverage information for competitive advantage in a deregulated and highly competitive market scenario;
- Move up the value chain;
- Achieve higher customer service and satisfaction;
- Improve operational efficiency and productivity; and
- Optimise costs.

The Company covered its entire business operations through nine SAP Modules\* integrated with each other. SAP R/3 release version 4.7C has been installed on Solaris 9 operating system and platforms. Oracle database management system is used to store data in SAP.

### **6.2 Objective of Audit**

The main objectives of audit were to assess that:

- (i) the SAP- ERP solution met the Company's requirements;
- (ii) the adequacy of mapping of business and managerial requirements; and
- (iii) the input, processing and output controls were in place to ensure reliability and integrity of data and the information / documents / reports generated through SAP were accurate and met all managerial, customer and statutory requirements.

### **6.3 Scope of Audit**

Audit reviewed the overall performance and value addition of four modules namely Material Management, Sales & Distribution, Project System and Human Resource Transactions, system reports\* and source documents for the period April 2005 to March 2007 in the Plants at Pata and Vijayapur, offices at Mumbai, Noida and Corporate Office at New Delhi were examined in Audit.

### **6.4 Audit criteria**

The following constituted the audit criteria:

- (i) Objectives set by the Company at the time of conceptualisation of ERP.
- (ii) Corporate rules and procedure, government guidelines.
- (iii) Best practices in IT development and implementation.

### **6.5 Audit methodology**

Audit was conducted using the following methodology:

- (i) Correspondence and questionnaire issued to the Management and its feedback.
- (ii) Scrutiny of minutes of Board and Steering Committee meetings, source documents and system reports.
- (iii) Data analysis of standard and customised reports from the system using CAAT.

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\* *Material Management, Sales & Distribution, Plant Maintenance, Project Systems, Finance & Controlling, Human Resource, Production Planning, Quality Management and Customers Relationship Management*

♦ *System Reports: Standard SAP reports and Company's customised reports.*

## 6.6 Audit findings

The customisation and utilisation of four modules was analysed on the basis of sampled transactions, business related policy and rules mapped therein. The findings of audit in these areas are given below:

### 6.6.1 Non-mapping and non-usage of available functionalities

- (i) **Sales & Distribution module:** Two of the three business activities<sup>♦</sup> namely 'Natural Gas' and 'Telecommunication' businesses of the Company were not fully mapped in SAP. The module was being used only for invoice generation for the two business segments. The Company was using Gas Management System (GMS), a stand-alone package for capturing information relating to supply of Natural Gas.
- (ii) **Project System module:** It was noticed that the Company continued to use legacy software ('Primavera') for project scheduling and monitoring despite these being the basic functions of Project System module of SAP. The module was used only for procurement related activities integrated with Material Management module.

### 6.6.2 Material management module

The basic functionalities of Material Management (MM) module are to maintain material and vendor master, procurement, inventory management, material planning and valuation records.

#### 6.6.2.1 Input controls

Input controls ensure that the data received for processing are genuine, complete, accurate, properly authorised and are entered in time and without duplication and thus ensure correctness and completeness of data. The deficiencies arising out of lack of input controls in the MM module noticed in audit are detailed below:

##### (i) Absence of uniform codification of materials

The Company has a Material Codification Cell to bring about unique codification for materials and rationalisation of Unit of Measurement (UoM). A review of material codes and their UoM revealed following inadequacies:

- Two hundred and seventy three material codes were carrying measurement in numbers (each) instead of as they should in sets carrying more than one unit.
- Twenty four materials were recorded in fractions though the UoM was in whole number (each).
- Thirteen thousand six hundred and ninety one multiple material codes, ranging from 2 to 26, were used to define 6140 out of 111835 items of materials. This led to purchase of 404 materials (by description) under 901 different material codes thus foregoing the benefits of unique material codification and integrity of the data.

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<sup>♦</sup> Natural Gas, Telecommunications and Petrochemicals

Non-uniformity in material codes and existence of duplicate material codes affected the reliability of the data and could result in defective MIS reporting, wrong measurement and inadequate inventory control.

The Management accepted the fact and stated (August 2007) that unique codification and rationalisation of UoM and reduction/elimination of duplicate codes was being taken care of. However, the Company, though implementing the System since 2004-05, was yet (November 2007) to achieve the desired uniformity.

**(ii) *Absence of input controls for closing the plant maintenance orders***

It was noticed that in absence of input controls, 79831 out of 188947 plant maintenance orders for the period 2005-07 were closed without capturing the starting and finishing dates of maintenance work. In absence of such details, the actual utility of the plant and equipment and inventory could not be assessed, monitored and ensured.

The Management stated (August 2007) that recording of job start/finish time and date was made mandatory for planned maintenance orders since November 2006 and optional for other maintenance orders. However it was noticed that such details were not captured in respect of planned maintenance jobs even after November 2006 and it should be made mandatory in respect of other maintenance jobs also.

**6.6.2.2 *Validation checks in material procurement***

Validation checks ensure that the data conforms to the business rules and thus ensure the correctness of data. The procurement process right from the PR stage to placing of PO on the vendors (except the process of getting administrative and financial approvals) has been mapped into the MM module. A review of the procurement process through the system revealed following deficiencies in validation checks.

**(i) *Pending purchase requisitions***

It was noticed in audit that procurement actions were yet as on 6 June 2007, to be taken in respect of 2301 PR for materials and 1319 PRs for services/works, even though the delivery dates indicated against them had already lapsed. In absence of required controls to disable redundant PRs, risk of creation of fresh for the same material and purchases there against could not be ruled out.

The Management accepted the observation and stated (August 2007) that action would be taken to review and close the pending PRs periodically.

**(ii) *Delivery date in purchase orders***

It was observed that validation checks were not available in the system to validate scheduled and actual delivery dates with PO dates. This resulted in creation of 1815 out of 2965 POs placed during 2006-07 with the scheduled delivery dates prior to the date of POs.

Due to non-validation of scheduled delivery date, MIS data on procurement of material and execution of PO by scheduled delivery date could not be generated to ensure completion of jobs as scheduled, to avoid stock-out position, to ensure compliance of delivery (time and schedule) by the vendors and to avoid manual calculation of penalties like liquidated damages on vendors.

The Management accepted the audit observation and assured (August 2007) that necessary validation checks would be incorporated in the system and the necessary reports developed.

### ***6.6.2.3 Non-utilisation of available features***

The Company failed to use the following transaction, businesses and policies and rules mapped in the MM module. Certain businesses were also inadequately mapped into the system as detailed below:

#### ***(i) Reminder feature***

Standard SAP-ERP system has an inbuilt reminder feature for keeping track of the purchase orders issued. This feature, however, was not being used and the reminders were issued manually. There were 4460 numbers of materials in 1644 purchase orders that remained undelivered or partly delivered beyond their delivery dates as on 31 March 2007 for which reminders were not generated through the system despite such a feature being available.

The Management accepted the audit observation and stated (August 2007) that issue of reminders through system would be implemented.

#### ***(ii) Material requirement planning***

The Company has not defined minimum, maximum and re-ordering inventory levels and related information thereto in the MM module.

In absence of these parameters in the MM module, anomalies as follows were noticed:

- 'zero' stock in 17856 items of material that could result in non-replacement of spares during shut down/maintenance jobs;
- a non-moving inventory to the extent of Rs.56.16 crore at Pata and Vijayapur Plants; and
- materials valuing Rs.10.52 crore idle for period ranging 9 to 15 months after their purchase.

The Management stated (August 2007) that action to define various stock levels in Material Masters would be taken.

#### ***(iii) Information regarding lead time for Inventory***

The system was not designed to capture lead-time details vendor-wise and material-wise. Therefore it was not possible to extract vendor wise and material wise delays in the delivery beyond anticipated lead time.

The Management stated (August 2007) that the system had been designed to capture lead-time details and reports were available vendor-wise and material-wise. The reply, however, cannot be accepted as only the processing time taken from PR stage to PO stage were captured and the time taken by the vendor to deliver the materials was not captured to ensure delivery in time, to plan delivery schedules and to maintain desired inventory levels.

**(iv) Non-tracking of obsolescence of inventory, machineries and equipments**

There was no provision to capture and track shelf life and the expiry date of the inventory, machineries and equipment. In absence of such provision, the system could not prompt the users for impending obsolescence.

Due to non-capture of obsolescence details, the risk of belated decisions for procurement, replacement and disposal of obsolete spares, machines and equipments continued.

The Management stated (August 2007) that shelf life and expiry date was being monitored manually and the feasibility of controlling these through the system would be explored. The reply of the Management thus confirmed non-utilisation of the SAP system for the purpose.

**(v) Procurement of materials and services for projects**

The Project System module was integrated with MM module to facilitate procurement of materials and services. It was noticed that though purchase requisition and purchase orders were issued through the system, the system was not used for issuing request for quotation and preparing comparative statement of quotation received prior to placing of POs.

Further, POs amounting to Rs.494.83 crore out of POs amounting to Rs.571.33 crore in respect of Dahej-Uran Pipeline Project were placed without raising PRs (July 2007).

The Management agreed (August 2007) to review the same for issuing necessary instructions to follow the complete procurement cycle.

**6.6.2.4 Non-customisation of the system**

Deficiency in customising various business rules in the system was observed relating to the following business requirements:

**(i) Liquidated damages**

The enforcement of liquidated damages clause as per agreement in respect of late/undelivered purchase orders was not built in to the system. Accordingly, the liquidated damages were calculated and levied manually.

The Management stated (August 2007) that the feasibility of levying liquidated damages through the system was explored during implementation without success.

However, the Management did not specify the impediments to successful implementation of this feature of the module.

**(ii) Repaired/repairable inventory**

The system was not configured to capture inventory of repaired/repairable items and the spares used for their repair/overhauling.

Due to non-maintenance of these details, inventory control could not be exercised over such items besides analysis of frequency of repair and economies of repairs over new purchases was not possible. It was noticed that as on 31 March 2007, three spare Gas Generators valuing Rs.5.08 crore net of custom duty and delivery charges, out of nine spare Gas Generators were lying with vendors for repair/overhauling. Due to shortcoming in the customisation of the system, these could not be tracked through the system for proper monitoring.

The Management stated (August 2007) that provision existed for capture of repaired/repairable inventory with material code having last digit source indicator as seven and eight. However, it was noticed that no stock with such material code existed in the system as on 31 March 2007.

*(iv) Non-availability of guarantee/warranty features*

The provision to capture information relating to warranty/guarantee terms of the materials procured was not available in the system. Absence of this provision posed the risk of failure to use/test the usability of the equipment within the warranty/guarantee periods and to invoke the same wherever the situation warranted.

The Management stated that (August 2007) the matter has been taken up.

**6.6.2.5 Other point of interest**

***Inadequate mapping of machinery spares***

Accounting Standard 10 of the Institute of Chartered Accountants of India requires that all machinery spares should be capitalised and depreciated fully, if they could be used only for a particular Fixed Asset and have irregular use.

However, it was noticed that only spares classified as insurance spares in the system were capitalised and the materials of same description (990 spares) valuing Rs.17.57 crore were kept as O&M inventory instead of disclosing the same as machinery spares. As a result, the provisions of AS-10 regarding capitalisation of machinery spares were not followed.

Also, due to maintenance of similar inventory under different categories, the Company could not keep track of the availability of the material under one material code, fix various inventory levels, declare surplus wherever required and follow mandatory provisions of accounting.

The Management accepted and stated (August 2007) that this issue would be looked into 2007-08 and necessary decision would be taken.

**6.6.3 Sales and distribution module**

The module is primarily meant for monitoring market demand of the products of the Company; to keep record of the Company clientele, their credit worthiness and keeping track of orders and deliveries, and planning, controlling and monitoring sales and related activities/transactions. Audit analysis revealed the following deficiencies in customising and input and validation controls in the module:

**6.6.3.1 Non-customisation of the system**

Customisation of the system was insufficient and could not meet the following business requirements:

*(i) Non-mapping of polymer business requirements*

The Marketing offices of the Company communicate potential demand of polymers to Petrochemical Marketing Group (PMG), which after considering reasonableness of demands and material availability allocates the material to marketing office. The Marketing office based on the allocated material, confirm indents of consignment stockist/customers as sales orders. A review of this sales process revealed that:

- The basis (source data) of projection of product-wise potential demand was not captured and maintained in the system.
- There was no reporting on actual demands of consignment stockist made through indents and their comparison with actual sales order and dispatched quantity.
- There was no report available to compare the actual sales order quantities raised by the Marketing offices and actual dispatches there against to assess the performance of Marketing offices.
- Further, no records were maintained relating to cancellation/modification of the unexecuted/ partially delivered sales orders by the supplying plant in the event of price revision, production or logistics constraints.

Thus, it was evident that the system did not capture complete sequence of events from indenting to dispatch of material in absence of which the potential demand for polymers, loss of business due to cancellation/modification of sales orders and the business secured could not be ascertained in the system.

The Management while accepting the Audit observation (August 2007) added that dispatched quantity indicated performance of Marketing offices and the Plant. It may be stated however, that the dispatched quantity is indicative of performance of the plant whereas the performance of Marketing office depends on the sales orders confirmed by them.

**(ii) Interest on delayed payments**

The customers are to be charged interest for delayed payments. However, interest calculation on delayed payments was not mapped in the system and the same was done manually indicating underutilisation of the system.

The Management accepted the audit finding and stated (July 2007) that due to staggered rate of interest, the controls were not inbuilt in the system. The reply was not convincing as the interest could be calculated through a conditional table in the system.

**6.6.3.2 Input and validation controls in customer credit management**

**(i) Master credit data**

The Company maintained credit data of its customers including credit limit prescribed and actual credit extended thereagainst, in the system. Review of credit data available revealed that:

- The central credit data was not available for 4788 customers out of 9865 customers. There was an outstanding balance of Rs.459.36 crore as on 9 July 2007 against 376 customers for whom central credit data was not maintained.
- The credit limit for 5103 customers out of 5121 customers was defined as 'zero'. Despite a 'zero' credit limit, 156 customers were extended credit of Rs.140.03 crore (9 July 2007) and one customer was extended credit of Rs.0.23 crore against a credit limit of Rs.0.20 crore.

Lack of validation controls resulted in credit sales exceeding the the defined credit limits.

The Management accepted the audit observation and stated (August 2007) that credit data was not maintained in respect of customers receiving material through consignment

stockist and for Natural Gas customers. It further added that the system was configured to disallow any excess credit. The reply was not acceptable as credits in excess of limit were allowed by the system.

**(ii) Credit exposure against bank guarantees**

The sales/stock transfer orders of all the 38 consignment stockists for polymer products were allowed by marketing offices against the prescribed bank guarantee. The Company prescribed the exposure limits to the extent of two times the value of bank guarantee, if bank guarantee amount was less than Rs.50 lakh, at 2.5 times if the bank guarantee was between Rs.50 lakh to Rs.2.10 crore and equivalent to bank guarantee if it exceeded Rs.2.10 crore.

The system was not designed to calculate automatically the exposure limits based on the above stated rule. The Marketing offices were independently defining the exposure limits which were being fed into the system. In absence of required controls a review revealed that:

- The exposure was above the prescribed limits to the extent of Rs.31 lakh for three consignment stockists while the exposure was below the prescribed limits to the extent of Rs.23.19 crore for 15 consignment stockists. Further, exposure to the extent of Rs.3.47 crore was shown as blocked for five consignment stockists even though no bank guarantees existed as on 9 July 2007.
- Material was shown under custody of one consignment stockist despite non-existence of a valid bank guarantee there against as on 9 July 2007.
- In two out of ten cases, bank guarantees were revalidated without valid supporting documents.

The Management in its reply (August 2007) stated that credit worthiness was not being maintained in the system and exposure was defined in the system on the advice of Marketing offices. This revealed absence of coordinated approach towards mapping of credit sales policy of the Company.

**(iii) Insufficient and inadequate letter of credit**

The invoices for sale of natural gas were raised fortnightly and the resultant outstanding was secured by seeking Letter of Credit (LC) as agreed upon in Gas Supply Agreement (GSA). A review of details of 827 natural gas customers revealed that:

- The LCs were available for 156 customers including incomplete LCs for want of further documents in respect of 56 customers indicating deficient input controls.
- In case of 25 natural gas customers, the outstanding as on 31 March 2007 was Rs.79.47 crore against which LCs amounting to only Rs.26.53 crore were available with resultant deficit of Rs.52.94 crore indicating deficient validation checks. Out of these 25 customers, complete LCs were available for 16 customers only.

In absence of complete LC details, adequacy of LCs in terms of the GSA could not be ensured and timely renewal of LCs, reasonableness of the extent of credit sales and adequate security thereagainst could not be ensured.

The Management accepted and confirmed (August 2007) that there was provision in SAP to capture LC details without affecting invoicing and necessary directions would be issued in this regard.

#### **6.6.4 HR module**

HR module includes processes relating to recruitment, personnel administration activities, payroll activities, salary processing, individual career planning, training, administration, leave management and manpower planning. However, test check revealed deficiencies in input controls and validation checks required to ensure the correctness and completeness of data.

##### **6.6.4.1 Lack of validation checks**

###### **(i) House building advances**

Test check of 2014 records relating to the 'loans and advances' revealed the following deficiencies:

- In 45 cases sanctioned advance was more than Rs.16 lakh (the maximum ceiling under House Building Advance (HBA) Rules).
- As per HBA rules, advance could only be sanctioned twice, whereas, test check in the system revealed that in case of 23 employees HBA was sanctioned upto eight times.
- In 99 cases the take home pay (net pay) after recovery of HBA instalment on account of HBA and other deductions was less than 20 *per cent* of the gross salary which is against provisions of HBA rules.

In absence of validation checks, the compliance of the provisions of HBA rules could not be ensured through the system.

##### **6.6.4.2 Non-mapping of requirements**

###### **(i) Human resources**

Review of business requirements in respect of Human Resource and its implementation revealed the following inadequacies:

- The information about availability of accommodation in residential complexes had not been mapped in SAP.
- Provident fund and pension information/data/transactions were not captured in SAP-ERP package and Provident Fund and Pension System Module of the legacy system was still being used.
- The training requirements were captured in an independent Electronic Performance Management System (EPMS) whereas training calendar was prepared in SAP-ERP.

The Management accepted and stated (August 2007) that SAP does not support functionality in respect of residential accommodation.

**(ii) Conveyance advances**

Due to incomplete information relating to advances available in the system, the compliance of provisions of conveyance advance rules could not be ensured.

**(iii) Medical reimbursements rules**

In absence of mapping of provisions relating to medical attendance rules in the system, the validity of processing of claims could not be ensured.

The Management accepted the observations and assured (August 2007) to take necessary action.

**6.7 Business continuity plan**

**6.7.1 Disaster recovery site**

The Company has not formed a full-fledged disaster recovery centre even after two years of implementation of ERP, although Board of Directors approved it in June 2002 to be set up at Jaipur. The Company was managing its disaster recovery requirement through stand-by server located at GAIL training institute, Noida that could handle only low intensity failures.

**6.7.2 Deficient problem solving mechanism**

The SAP solution has a centralised helpdesk in place to redress the problems faced by users in SAP environment.

Review of complaints/requests handled by the helpdesk during April 2006 to April 2007 revealed that out of 7385 issues raised by the users, 5529 took three to 199 days to be resolved. Further, out of 35 unresolved issues, 29 issues were pending for a period more than three days to upto 161 days. It is evident that control mechanism has not been defined to resolve the problems of users at the earliest.

**6.8 Conclusion**

Non-mapping of certain vital business requirements and functionalities, lack of customisation and lack of utilisation of all available features led to underutilisation of the ERP SAP solution. The system further suffered from lack of input controls and validation checks. These inadequacies resulted in incompatibility of the system to meet all business requirements, created risk of defective/ delayed MIS reporting and decision-making leading to manual intervention and thus making database unreliable. The underutilisation of the system compromised the basic objectives of leveraging information for competitive advantage in the market, improving operational efficiency, productivity, achieving higher customer service and satisfaction.

**6.9 Recommendation**

The Management should consider the following measures for implementation to optimise the benefits from the ERP system:

- Ensure customisation and usage of the ERP solution as per business requirement, statutory requirements and guidelines of the Government and policies of the Company. A time bound review of all the modules should be conducted to ensure compliance with applicable business rules.

- All the available functionalities of the ERP system should be customised to the meet the business requirements. To derive optimal benefits from the ERP system, different modules should be integrated.
- Ensure that input controls and validation checks are inbuilt in the system and are applied to data entered in the system to strengthen internal control procedures.
- The 'Master Data' needs to be revisited/reviewed periodically for ensuring veracity of the data and authorisation thereof.
- In the areas of input control and business continuity plan, the Company should evolve suitable security policies with clearly defined procedures and responsibilities.

The matter was reported to the Ministry (December 2007), its reply was awaited.