

CHAPTER XI : MINISTRY OF SCIENCE AND TECHNOLOGY

Department of Scientific and Industrial Research

11.1 Functionality of IT Application System ‘OneCSIR’

The IT Application System ‘OneCSIR’ developed by the Council of Scientific and Industrial Research could not be utilised to its full potential due to non availability of some of the modules leading to non implementation of several processes in the system and lack of input controls & validation checks that rendered the database incomplete and unreliable.

11.1.1 Introduction

Council of Scientific and Industrial Research (CSIR ¹ decided (June 2009) to computerise processes² at its headquarters (CSIR Hq) in Delhi and 38 National Institutes/Laboratories & six Units (**Annexe-11.1**), in accordance with the Government policy of bringing transparency and electronic governance. The Enterprise Resource Planning (ERP) solution was divided into six³ modules and six⁴ different Consultants were hired (January-March 2010) for the design, development and implementation of each module, with a view to completing the work in eight months (by March 2010). The warranty period of the project was 12 months followed by Maintenance Service Support (MSS) for four years. A budget allocation of ` 12.51 crore was approved (June 2010) for the project.

The ERP software architecture was developed on the .Net (dot net) 4.0 platform as its front end and SQL server as the back end. The Central Database and Application server located at SERC, Chennai⁵ was interconnected with the CSIR laboratories *via* National Knowledge Network (NKN) channel through a Virtual Private Network (VPN) connection. The CSIR ERP system (OneCSIR)

¹ An Autonomous Body under the Department of Scientific and Industrial Research

² Administration, Stores & Purchase, Finance, Research & Development (R&D), Office File System, etc.

³ Human Resource (HR) Portal (RFP-1), Portal for Enterprise Learning and Knowledge (RFP-2), Research and Development (R&D) & Planning Portal (RFP-3), Infrastructure/Engineering & Services Portal (IESP) (RFP-4), Policy and Programme Module (PPM) (RFP-5) and Finance & Accounts Module (FAM) (RFP-6)

⁴ M/s Right Management along with M/s Tekmindz, M/s Excelsoft Technology Pvt. Ltd., M/s Mindtree Ltd. M/s TCS, M/s Newgen Software Technologies Ltd. and M/s Vayam Tech.

⁵ Structural Engineering Research Centre, Chennai is a constituent laboratory of CSIR.

was launched in September 2012. As of March 2019, CSIR had incurred expenditure of ` 33.63 crore⁶ on its development.

An audit of the OneCSIR ERP system was undertaken for the period 2012-19, with the objectives of assessing the adequacy of various controls and security measures; accuracy and integrity of data and information/documents/reports generated and achievement of the objective of the development of the Application software. Audit findings with regard to objectives are discussed in the subsequent paragraphs.

11.1.2 Audit findings

11.1.2.1 System security measures

Audit observed that though the software was launched in September 2012, a web application security audit of the system was conducted only in April 2019 and certificate obtained in December 2019. Audit observed the following security risks: (i) Controls to change passwords periodically and to limit the number of invalid password attempts were not adequate (ii) the system was not deactivated automatically even after repeated unsuccessful attempts by unauthorised users (iii) Temporary staff were using passwords allotted to permanent scientific, technical and administrative staff for the operation of the ERP application.

Further, CSIR did not have own IT security policy and followed the IT security policies and guidelines of Government of India for website, security issues, etc. CSIR stated (November 2020) that password policy would be implemented and secrecy maintained.

11.1.2.2 Business continuity and disaster recovery

CSIR had not framed and documented a business continuity plan for periodic back up of processes and disaster recovery plan for recovering key business processes in view of potential disasters, even after seven years of implementation of the ERP software. CSIR had one Central Database and Application server installed in Chennai. In view of the flood situation in Chennai, it was planned (July 2016) to install servers at three different places as a remedial measure under disaster management on priority basis. However,

⁶ ` 8.04 crore (till 2018-19) towards payment to Vendors for the development of the application software against agreed cost of ` 12.51 crore. Besides, ` 2.51 crore, ` 12.72 crore and ` 10.36 crore were incurred for establishment of server and procurement of hardware/software and for engagement of manpower for the project respectively.

CSIR had not installed the alternate disaster recovery servers at different places as of September 2019. CSIR had also not identified the potential risk of service disruption of the IT system and measures to prevent it. The absence of a comprehensive disaster recovery management made the entire database vulnerable to risks in the event of a hardware crash.

CSIR stated (November 2020) that a draft plan was under submission and would be implemented from 2021-22.

11.1.2.3 Maintenance and Support Services

As per the business agreements, the Vendors were to provide software Maintenance and Support Services (MSS) for four years after completion of one-year warranty period by entering into Service Level Agreement (SLA) at an agreed cost. The warranty on the ERP expired in September 2013. It was seen that CSIR did not enter into any SLA with the Developers. Due to non finalisation of the SLA, CSIR could neither insist that the Vendors rectify the bugs and errors nor could it ask for support regarding revision/change requests during the MSS phase.

11.1.2.4 Development and implementation of modules

The software developers had to develop the application system as per the functional requirements based on the specifications finalised through System Requirement Specifications (SRS) documents. The Project Clearance Technical Board (PCTB)⁷, while reviewing the design and development of various modules, observed (March 2011) that several features of the modules were modified, redefined or altered following feedback received from the users. A significant number of new processes⁸ that were not covered in the original scope of the project were also decided to be incorporated (June 2013) in the developed application. This indicates inadequate Business Process Re-engineering in the migration of all the existing processes into the functionalities of the new system. None of the new processes were developed. As a result, though the ERP application was launched for online use in September 2012, the certification for ‘Go-live’ was not issued.

⁷ Constituted for review and clearance of the deliverables and recommend for payments against the deliverables submitted by the Vendors

⁸ Revoking the name of employee who exits from laboratory due to transfer, death, retirement or resignation in HR module, implementation of GL & SL code for proper accounting entries, classification and unique coding for procurement items, construction materials for infrastructure creation, maintenance and management and integration of vendor price for preparation of estimates for works in material management module, etc.

Further, audit noticed the following shortcomings in implementation of the modules developed:

- * The modules were not in operation in all the laboratories/CSIR Hq.
- * Where the modules were operational, there were some processes in the ERP modules that though developed, were never used. The module wise processes that were not utilised are shown in **Table No. 1**.

Table No. 1: Processes not utilised

Module	Number of Labs in which not operational (September 2019)	Where operational, processes that were not utilised	Remarks
HR	10	Probation and confirmation, Seniority Matters and Transfer	CSIR stated (November 2020) that these applications were meant for implementing in stages. The fact remained that these processes were not utilised.
Finance and Accounts	23	Head wise preparation of budget estimates, compilation and consolidation of demands in respect of laboratories/Headquarters	-
Infrastructure/ Engineering and Service Portal	20	Proposal of indent, preparation of preliminary estimate, approvals of competent authority, NIT and final placement of Work order, agreement. Sub-processes of Facilities Management, Maintenance Operations & Related Services Module	CSIR stated (November 2020) that implementation of works related transactions like NIT, etc. would be taken up.
Research and Development (R & D) & Planning Portal	16	Demand for grants, Five Year Plans, Outcome Budget, Annual Report, Half yearly Performance Report, NMITLI, Business Development Activities under sub-modules PPD, sub-modules of USD and ISTAD.	CSIR stated (November 2020) that these processes could not be taken up for implementation as the process are mostly dealt in files and were proposed in the second phase. The fact remained that these processes were not utilised.
Policy and Programme	24	Committee formation and meeting management, RTI process, Legal management, Awards, policy creation and amendment, interpretation and clarification.	CSIR stated (November 2020) that Committee formation and meeting module, are implemented in CECRI. RTI could not be done as there is a separate portal launched by CIC. The fact remained that the processes were not operational in all CSIR labs.

Module	Number of Labs in which not operational (September 2019)	Where operational, processes that were not utilised	Remarks
e-Learning	Nil	Training programme, Assessment, Newsletter and asset for knowledge repository and publications	CSIR stated (November 2020) that training programs, assessment and test were used by HRDC for its training. The fact remained that the module was not used by all the laboratories.

- * Many processes were either not developed or were developed but were not operational; the module wise status of these is shown in **Annexe-11.2**.
- * As progress with regard to implementation of the ERP in laboratories was very slow, CSIR decided (April 2014) that the ERP would be implemented in one laboratory initially in a month and concurrently in five other laboratories within the next three months. However, full implementation of ERP was not achieved in any of the selected laboratories as of September 2019. Details are shown in **Annexe-11.3**.
- * It was seen that laboratories⁹ were using various in-house/customised software for daily official works despite the processes developed in the ERP system. Details are shown in **Annexe-11.4**.

The reasons for non implementation were attributed by CSIR to software not being user friendly, too many glitches, repetitive and complicated processes, absence of seamless integration, poor working speed, issues not resolved by the software developer, etc.

Thus, the ERP system was launched with incomplete software development work and without ensuring preparedness of the laboratories to utilise the software. This resulted in the ERP remaining virtually unused in CSIR.

11.1.2.5 Operations performed through the software modules

Deficiencies observed in the functional processes are discussed below:

11.1.2.5 (A) HR Module

The HR Module was proposed for maintaining and managing profiles and automation of all establishment related matters of the employees. The module was interlinked with other modules as it contained basic database of all the

⁹ NCL, IMMT, CECRI, CIMAP, CFTRI, NIO & IMTech.

employees. Some of the significant issues observed in the module are listed below.

(i) HR sub-modules had basic deficiencies such as HBA sub-module was not updated to the provisions of the Seventh Central Pay Commission (CPC); Leave sub-module did not include processes for Commuted Leave, Maternity/Paternity leave, which had to be processed manually, as process flow was not mapped to the Director level. Further, the EL balance of a number of employees as per the service book did not match with the EL balance as per ERP generated reports.

CSIR stated (November 2020) that the HBA sub-module was not adopted by the labs due to there being few takers for it. The reply is not correct, as the sub-process was not used because it was not updated as per provisions of Seventh CPC. CSIR also did not fix the bug related to process flow up to Director level in the cases of leave.

(ii) There were functional errors in the system. For instance, in the LTC sub-module, the system had no validation check to prevent fresh recruited employees from availing LTC for anywhere in India in any block year in addition to 4th and 8th block years¹⁰.

CSIR stated (November 2020) that the bugs in this regard would be fixed.

(iii) There were issues in interlinking with other modules. For e.g. for preparation of pay bills, detailed mandatory information comes from HR Module, Finance and Accounts (FA) Module and Planning and Performance Division (PPD) of R&D Planning Portal. The requisite functionalities could not be done through the aforesaid modules¹¹ and the pay bills were being prepared by entering this updated information manually and then using the ERP system for making payments. Moreover, ERP had no interface with ECS¹² payment system. Thus, the ERP system had no end to end solution for preparing pay bills.

CSIR stated (November 2020) that pay fixation and linking of ECS system could not be automated due to the need for manual interpretation and security

¹⁰ As per DoPT orders dated 26 September 2014, fresh recruits are allowed to travel to their home town along with their families on three occasions in a block of four years and to any place in India on the fourth occasion. This facility shall be available to the fresh recruits only for the first two blocks of four years applicable after joining the Government for the first time.

¹¹ Pay fixation in HR module, FA module and Planning and Performance Division (PPD) of R&D Planning Portal.

¹² Electronic Clearing Service

issues. CSIR also stated that Income Tax calculation would be taken up from next financial year.

(iv) There were issues observed in other sub-modules *viz.* employee database, LTC, newspaper reimbursement, etc. The details are given in **Annexe-11.5**.

As a result of system deficiencies, many operations were done manually. The above observations indicate that the system lacked logic controls, important linkages and validation checks, which rendered it unreliable for accurate and complete transactions.

11.1.2.5 (B) Finance & Accounts Module

Prior to the development of the ERP system, CSIR and its laboratories were using IMPACT software for their finance and accounts operations. The Finance & Accounts (FA) Module in the ERP system was designed and developed for automation of all accounting functions *viz.* payments of all type of bills, preparation of Ledgers, Broadsheet, Income & Expenditure Account and Balance Sheet of CSIR. The following deficiencies were observed in audit:

(i) The FA module was not utilised at CSIR Hq due to dissimilar accounting operations in laboratories and Headquarters. These dissimilar operations were not identified during the planning and development stage. Further, the system was developed without proper codification for accounting heads of expenditure. The codification used in IMPACT software did not match with ERP Codes. As such, payments of bills could not be processed through the system and were passed for payment manually. Due to this, proper Ledger Account and thereby generation of various accounting reports and preparation of Final Account could not be done through ERP. CSIR continued to use its IMPACT software for compiling its annual accounts, which defeated the purpose of development of the ERP system.

CSIR stated (November 2020) that FA module has been implemented from the current FY in CSIR Hq, and that efforts were on to compile the annual accounts through ERP, and to stop IMPACT from 2021-22.

(ii) The certificate of validation of the module was issued on isolated basis in November 2011 pending development of features like annual reports of GPF/CPF, Balance Sheet etc. Features namely accounting of Fixed Assets i.e. Gross amount, Depreciation, Net amount etc., could not be tested as it was dependent

on the inputs from other modules. It was seen in audit that no validation certificate of the module was issued till the time of audit.

CSIR stated (November 2020) that validation is an ongoing exercise. The fact remained that status of validation of the pending features was not stated/available in the absence of the validation certificate.

(iii) The module was to have processes for the management of pension. It was seen that pension related functionalities viz., date of retirement/death, emoluments and pay scale received immediately before retirement/death, type of pension, fixation and revision of pension, etc. were not developed in HR module. These were also not interlinked with the FA module. As a result, bills were being preparing manually and uploaded in the FA module for payment.

CSIR stated (November 2020) that exit process and pension calculation sheet will be implemented from 2021-22.

11.1.2.5 (C) Infrastructure/Engineering and Service Portal (IESP)

Infrastructure/Engineering and Service Portal (IESP) was developed to automate processes like Facilities Management, Maintenance & related Services, Contracts Management, E-Procurement, Stores/Inventory & Project Management. The functionalities were developed in three sub-modules (i) Engineering Services Module (ESM), (ii) Material Management Module and (iii) Facilities Management, Maintenance Operations & Related Services Module. Audit observed the following deficiencies in the portal.

(i) Purchase processes in the ERP system were not mapped up to the level of Director (laboratory level) where approval was required.

CSIR stated (November 2020) that workflow was limited to Project Leader in the purchases done through Project Mode and Director's *in principle* approval was taken on the file. The fact remained that the process flow in the ERP system for procurements requiring the approval of Director was incomplete.

(ii) Analysis of tables¹³ for capturing purchase order wise details of stock revealed that in 1,013 cases the receipt dates entered were prior to the date of purchase orders.

¹³ MM_TM_STOCK_RECEIPTS and MM_TM_STOCK_RECEIPT_DETAILS

CSIR stated (November 2020) that this validation check was not implemented in order to regularise the purchase date in case of field purchases made by scientists in remote stations. The fact remained that all procurements were not done through the ERP system.

The above deficiencies in the module indicate lack of input controls and validation checks as well as poor customisation of the processes.

11.1.2.5 (D) Research and Development (R & D) & Planning Portal

Development of R&D and Planning Portal was proposed for management of various research activities. Three sub-modules namely Planning & Performance Division (PPD), Unit for Science Dissemination (USD) and International Science and Technology Affairs Directorate (ISTAD) under R&D portal were developed for automating the processes *viz.*, planning and management of different R&D projects, business development activities, handling of international cooperation of CSIR laboratories etc.

Audit observed that the sub-modules on USD and ISTAD contained only test data and were not utilised. Further, the sub-module Annual Plan was not in use in CSIR Hq, as such information from the laboratories and its consolidation for the preparation of the Annual Plan could not be done through the system. Further, the sub module was developed without adopting the required standard conventions, and was unable to automate the process of Annual Planning, as envisaged. Also, the sub-module was unable to create unique identification for the various projects. Further, details regarding project start/end date, cost etc., were either not captured or were captured inaccurately.

CSIR accepted (November 2020) that consolidation of annual plan was not implemented. CSIR also stated that the cases of missing start/end dates were due to reasons like project not having materialised, etc. The reply of CSIR indicates that the ERP system enabled submission of project proposal without project start/end dates.

Thus, R&D portal could not be utilised to its full potential as envisaged and there was continued dependence on manual work.

11.1.2.5 (E) Policy and Programme Module (PPM)

The PPM module was developed to perform functionalities including processing of all policy related matters, record management of various

documents and electronic file management. Audit observed that the system was used only for policy uploading. Process like policy Creation & amendment, interpretation & clarification were not made through the system. As a result, users could not make/change and ask for its relevant interpretation or clarification related to the uploaded policy documents and circulars.

CSIR stated (November 2020) that policy amendment and clarification process through PPM module will be taken up for implementation.

11.1.2.5 (F) e-Learning Module

The portal was developed for enterprise learning, training, competency development, and as a digital repository for publications, dissemination of knowledge and practices for organisational learning. As mentioned in para 11.1.2.4, the modules on Training Programme, Assessment and Newsletter were developed but not utilised. The proposed objective to facilitate the transformation of CSIR as a learning organisation leveraging continuous improvement facilitated by the NAUTICAL (Novel Assessment Units for Training, Innovation, Capacity Augmentation and Learning) units at CSIR Hq, and its laboratories by developing e-Learning module could not be achieved.

CSIR stated (November 2020) that e-Learning module was used in HRDC, Ghaziabad for in house training. CSIR added that more steps will be taken to put this module into use.

11.1.3 Conclusion

CSIR did not formulate an IT policy for its IT environment including the ERP system to direct its actions and efforts. The management did not customise all the features in the ERP system. There was no business continuity plan and additional data recovery infrastructure was not set up, as envisaged. Non availability of some modules led to non implementation of several processes in the system. Lack of input controls and validation checks made the database incomplete and unreliable. Many important modules remained non functional. As a result, there was continued dependence on manual operations.

Thus, the system could not be utilised to its full potential due to infirmities in design, lack of comprehensive planning and deficient implementation, which is not expected from a premier scientific organisation like CSIR. CSIR needs to take immediate action to resolve the issues in the application and to develop a

robust and reliable system that fulfils the Government's objective of ensuring effectiveness of operations and transparency through electronic governance.

Department of Science and Technology

11.2 Purchase of air tickets through unauthorised travel agents

Jawaharlal Nehru Centre for Advanced Scientific Research, Bengaluru purchased air tickets for its employees through travel agents other than those authorised under extant orders, thereby incurring irregular expenditure of ` 4.61 crore.

In terms of Department of Expenditure, Ministry of Finance (MoF) OM¹⁴ (dated 16 September 2010 and 09 July 2013), for the purpose of official tour and for availing Leave Travel Concession (LTC), air tickets may be purchased directly from Airlines (at Booking counters/Website of Airlines) or by utilising the services of Authorised Travel Agents namely M/s Balmer Lawrie & Company, M/s Ashok Travels & Tours and Indian Railway Catering and Tourism Corporation Limited (IRCTC).

Audit examination revealed that Jawaharlal Nehru Centre for Advanced Scientific Research, Bengaluru (JNCASR) purchased air tickets for its employees from two private travel agencies¹⁵ other than the agencies authorised under the extant Government orders during the period from April 2013 to March 2020. JNCASR paid a total amount of ` 4.61 crore to the two private agents towards such purchases. Booking of tickets through unauthorised travel agents was in violation of the orders of MoF and resulted in irregular expenditure of ` 4.61 crore.

JNCASR justified (June 2019) their action stating that the local travel agents were used due to the remote location of their campus and lack of communication facilities. However, JNCASR stated (June 2019) that they had *in principle* dispensed with booking of air tickets through unauthorised travel agents with effect from September 2018.

The justification is not acceptable, as extant instructions clearly stated that air tickets for official tour and LTC were to be purchased either directly from the Airlines or through the authorised agents only. Further, audit observed that even after September 2018, JNCASR continued to utilise the services of private

¹⁴ Office Memorandum.

¹⁵ M/S Travel Explorer and M/S Jaybee travels.

travel agencies and made a payment of ` 48 lakh (September 2018 to March 2020) to the agent for booking of tickets for official tours and LTC.

Department of Science and Technology (DST) in its reply stated (October 2020) that JNCASR has now stopped the practice of booking air tickets through unauthorised travel agents. Further, JNCASR has been advised by DST to submit an appropriate proposal with proper justification for ex-post facto approval of the Department.