
KERALA PUBLIC SERVICE COMMISSION
3.3 Recruitment Application Processing System in Kerala Public Service Commission (REACT)
Highlights

- **Investment of Rs 66.94 lakh on IT assets in Phase II became redundant.**
(Paragraph 3.3.12)
- **Software relating to Phase III of computerisation costing Rs 21.60 lakh was still under development since January 2004 resulting in idling of hardware costing Rs 47.57 lakh.**
(Paragraphs 3.3.8 and 3.3.16)
- **There was a delay of six years in starting Optical Mark Reader valuation due to lack of proper IT strategy.**
(Paragraph 3.3.18)
- **Underutilisation of Optical Mark Reader machines was noticed.**
(Paragraphs 3.3.19 to 3.3.21)
- **The present system of valuation of answer sheets was vulnerable to risk of loss of data and data integrity.**
(Paragraph 3.3.25)

Introduction

3.3.1 The Kerala Public Service Commission (KPSC) is a body constituted under Article 315 of the Constitution of India to conduct examinations for appointment to various services of the State Government and advise the Government on matters relating to methods of recruitment and all disciplinary matters affecting the Government servants, among other things. The Commission also discharges functions relating to services and posts in the Government owned companies, corporations, local bodies and certain co-operative institutions in the State.

Organisational set up

3.3.2 The Commission consisting of a Chairman and 14* members has its Head office at Thiruvananthapuram, three Regional Offices^Ω and 14 District Offices. The administrative functions of the offices of the Commission are under the charge of the Secretary assisted by Additional Secretaries, Joint Secretaries, Deputy Secretaries and other supporting staff.

* Number of members increased to 19 in 2005

^Ω Kollam, Ernakulam and Kozhikode

Introduction of computerisation in KPSC

3.3.3 In order to clear the huge backlog of work, minimise delay in processing of applications and publish rank-list immediately after the examinations, the Commission resorted to computerisation by implementing the Recruitment Application Processing System (REACT) in March 2001.

3.3.4 Though the Commission initiated steps for limited computerisation of recruitment process in February 1993, it was in April 2000, based on the recommendations of the Technical Committee, that CMC Limited was short-listed and a work order was issued (June 2000) to develop application software with system study, beta testing, software implementation, training and source code.

3.3.5 The Software (REACT) was developed in Unix platform using the RDBMS package Oracle, with Visual Basic as its front-end.

3.3.6 While Phase I had two parts, the first part of development of the software covered the pre-examination process at a cost of Rs 1.75 lakh, the second part covered the post examination process (up to generation of rank list) at a cost of Rs 2.50 lakh.

3.3.7 Phase II of computerisation relating to replication of software to facilitate district level processing of applications cost Rs one lakh.

3.3.8 Phase III of computerisation covered automation of the functions of Recruitment, Examination and Advice Sections and networking of Head Office, Regional Offices and District Offices. The software was to be developed by CMC Limited at an estimated cost of Rs 21.60 lakh and the same was under development since January 2004 and as of May 2005, nine modules had been developed and were at testing stage.

3.3.9 The Commission had incurred an expenditure of Rs 5.36 crore as of March 2005 on computerisation (including Rs 2.45 crore on procurement of hardware and software, Rs 0.46 crore on printing Optical Mark Reader (OMR) answer sheets and Rs 2.45 crore on printing application forms).

Audit objectives

3.3.10 IT audit of REACT was conducted to assess the achievement of objectives of computerisation as well as to assess the adequacy of IT controls to ensure confidentiality, integrity and availability of data, programmes and systems.

Audit coverage

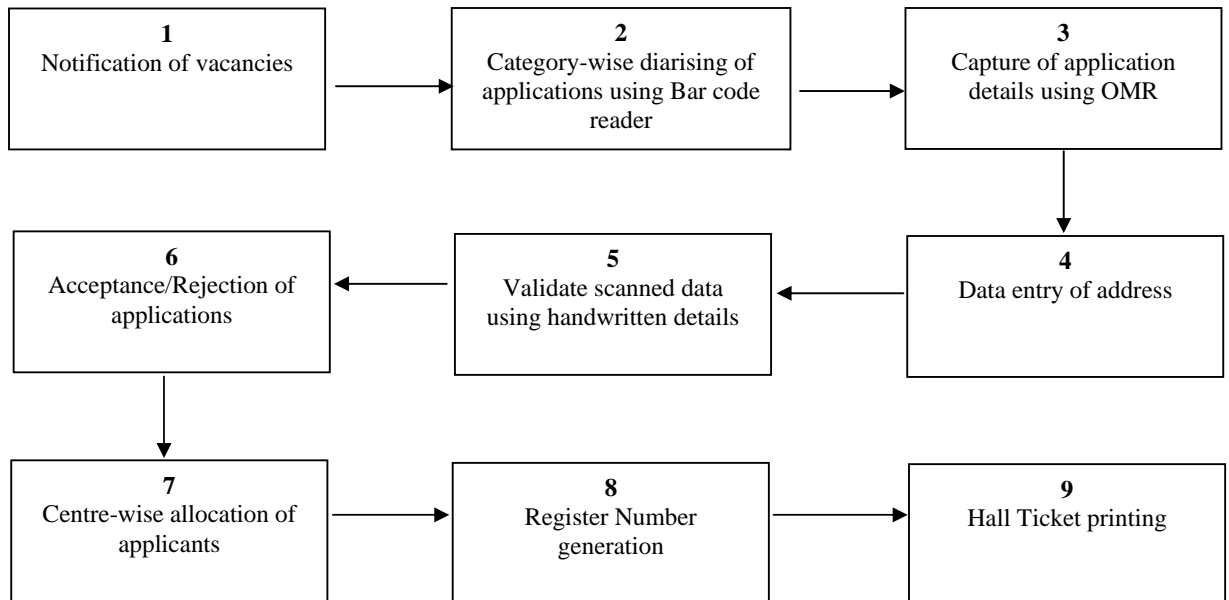
3.3.11 The IT audit conducted during July-October 2004 covered the Headquarters office, the Regional Office at Kollam and the District offices at Kollam and Thiruvananthapuram for the period from April 2000 to March 2004. As the Commission did not furnish the data relating to application

processing for audit scrutiny, citing confidentiality reasons, the data could not be analysed to assess its integrity and accuracy.

System Development

Partial utilisation of REACT Phase I-Part I

3.3.12 The first part of software development covered the pre-examination process as under:



But REACT Phase I Part I was not used, as intended, on the ground that the candidates who were not well versed in OMR application would commit a lot of mistakes and this would lead to rejection of a substantial number of applications during scanning. Instead, the Commission resorted to data entry of applications, which was not justified, for the following reasons:

REACT was developed for application processing through OMR but manual data entry was used

- According to System Requirement Specification and User Manual, the software was developed to capture application particulars through OMR application processing. The data entry module was also provided for entering the particulars pertaining to old pending applications and applications rejected by the OMR machine. However, the Commission went ahead with data entry process of all applications. There was no record as to how many applications were scanned, the percentage of rejection, etc., before deciding that the OMR scanning was not possible.

Manual data entry resulted in additional expenditure towards hardware

- The decision to resort to manual data entry of applications in the second phase of computerisation resulted in unnecessary expenditure of Rs 66.94 lakh towards purchase and installation of hardware and software at District and Regional Offices for data entry under Phase II.

Delay in data entry led to postponement of examination.

- Importantly non-utilisation of the OMR scanner, forcing manual data entry of application data had resulted in the postponement of the examination scheduled in June 2004 by 2 months. Hence, the very objective of computerisation could not be achieved.
- By resorting to District level processing of applications at 17 locations without proper feasibility study, instead of having a centralised database, the Commission was exposing the system to risk for its integrity and security of data as well as scalability.

3.3.13 The Commission stated (September 2005) that when 81,789 applications of a particular post were scanned as a test case about 22 per cent had to be rejected due to defective filling up of applications and the Commission felt this as an injustice to the applicants. This was not tenable as there was no record of scanning of 81,789 applications either in the OMR log book or in the AMU stock register.

3.3.14 As regards centralised database, the Commission stated (August 2005) that District Offices were functioning for attending to recruitment activities of posts earmarked for district-wise selections. It was further stated that the centralised database would require leased line facility which would lead to access to data by hackers/outsideers. But the reply was also not tenable as the Commission was contemplating Web-based application for which centralised database is a must. Moreover, it was observed that District Offices resort to transfer of data through internet and that too in non-encrypted format.

Non-utilisation of REACT Phase I-Part II

REACT Part II was not at all put to use

3.3.15 Though answer sheets were being scanned using OMR from February 2001 onwards, REACT Phase I-Part II covering the post-examination process was not at all put to use to generate shortlist of candidates and the rank list. Instead, an application developed in-house was used to generate the short list from the database created by OMR system. The Commission stated (September 2005) that preparation of rank list was the most important and sensitive part of recruitment procedure. This exercise took more time than expected and hence the delay in finalising and putting the programme into use. The delay in using the software after testing and acceptance was not justified as the objective of computerisation was not achieved despite making a large investment.

Delay in development of software (Phase III) by CMC Limited

Idling of hardware costing Rs 47.57 lakh

3.3.16 According to the proposal of CMC Limited (October 2003) which was accepted (January 2004), CMC was to fully develop the software for office automation (Phase III) within 6 months. Though more than a year has elapsed, the development was still at the System Requirement Specification (SRS) stage. As a result, the hardware costing Rs 47.57 lakh procured during March 2004 was idling for more than a year.

3.3.17 The Commission stated (September 2005) that the delay in development of software was due to the change in the scope of the Project by adding more and more modules to the System Requirement Specification (SRS) and

the hardware purchased was never kept idle but was utilised for checking and testing of the software. The reply is not acceptable because the scope of the project was to be finalised at the User Requirement Stage. Further, the argument that the hardware was utilised for testing and was never kept idle was not tenable as the hardware was purchased more than a year ahead of the development of software.

OMR Valuation of answer sheets

Delay in procurement of OMR

Delay of six years in procuring and utilising OMR

3.3.18 Based on Government's sanction (August 1995) for the limited computerisation, it was decided to introduce OMR type answer sheets, to conduct various examinations. However, the first OMR procured (1997) could not be used and hence returned (May 1998) to the vendor. Another OMR procured (November 1999) was used to scan OMR answer sheets only from 2001, thus resulting in a delay of 6 years in procuring and using OMR.

The Commission did not have a clear IT strategy

3.3.19 Moreover, the Commission did not utilize the OMR machines for application processing, thus necessitating Phase II at District and Regional offices. Thus, substantial delay in OMR valuation and non-utilisation of the software to scan the applications indicated the lack of a clear IT strategy.

Underutilisation of OMR machines

3.3.20 Out of 1096 posts for which examinations were conducted during 2001-04, OMR answer sheets were used only for 114 posts (10 *per cent*). The Secretary stated (August 2005) that selection to certain posts could not be conducted by objective type examination. It was further stated that the number of posts for which objective type examination was conducted was immaterial as 80 *per cent* of the candidates had appeared for OMR type tests.

3.3.21 While procuring the OMR machines, it was expected that the OMR machines could scan 5000 sheets per hour (i.e. 30,000 sheets a day of 6 hours utilisation). However, a scrutiny of the logbook revealed that OMRs were used to scan only 3000 sheets a day. Between February 2001 and July 2004, only 96 lakh sheets (48 lakh each of Part A and Part B) were scanned and no application form was scanned. The Commission stated (September 2005) that scanning of answer sheets involved different stages and hence it would not be possible to scan 30,000 answer sheets even with twenty-four hours working. The reply is not acceptable as scanning speed of the machine was 5000 answer sheets per hour as per the User Manual and the maximum output per day was computed reckoning the number of working hours as six per day keeping in view the time needed for the different stages. Evidently the failure to scan OMR applications mainly contributed to underutilisation of OMR.

Failure to mitigate risks in OMR scanning of answer sheets

3.3.22 OMR answer sheet is designed in two parts- Registration Number coding sheet (Part A) and Answer sheet Part (B), with common barcode number which can be deciphered only by using a barcode reader. After the examination, these parts are so separated that half the barcode appears in each part.

3.3.23 Valuation of OMR based answer sheet involves five stages-*viz.*,

- valuation of answer sheet Part B using OMR,
- generation of mark range of candidates and onward transmission to the Commission for appropriate decision regarding cut off mark,
- decoding of Register Number part (A) containing identification details of candidates,
- decoding of mark data (correlating Part A and Part B using barcode) and
- printing of marklist.

3.3.24 As per instructions (September 2002) governing the OMR scanning of answer sheets, the answer sheets (Part B) are packed in bundles of 500. After noting the number of each bundle these are to be transferred to Deputy Secretary (Examination) for scanning. After completing the scanning of answer sheets of all candidates, the mark range is generated and submitted to the Commission. The System Analyst is to maintain a Log Register showing bundle-wise scanning of scripts and the sealed floppy/CD containing mark data is to be kept under safe custody. Thereafter, the Register Number i.e Part A is to be scanned, decoded and correlated with the already scanned Part B. The short list is to be generated only after clearance by the Commission. CD/floppy containing the mark data and the identification details is handed over for safe custody to the officer designated.

3.3.25 A scrutiny of the logbook revealed the following deficiencies:

- The sequence of first scanning Part B containing the answers, then providing the marks range to the Commission to decide the cut off marks, and then only scanning Part A containing identifying details of the candidates to generate the shortlist is very vital to maintain confidentiality and to eliminate any kind of tampering. However, instances were noticed in Audit whereby this sequence was not strictly adhered to by the Commission. Audit noticed that in the examination for the post of Manager, Khadi Gramodyoga Bhavan held on 31 October 2001, 12,151 Part B answer sheets were scanned during April 2002. Then in June 2002, 12,377 Part A registration coding sheets were scanned. Later 13 more answer sheets were scanned during December 2002. Reconciliation in audit revealed that there exists a discrepancy between the number of Part A registration coding sheets that was scanned and number of Part B answering sheets that were scanned.

Scanned data susceptible to modification

- Scanned data was susceptible to modification, using Edit facility in dBase, without any audit trail. Moreover, there was no system of file comparison to detect variations in file size and field values.

Absence of prescribed procedure for valuation of answer sheets with duplicate barcode number

- Test check showed that there were 123 corrections in barcode and six corrections in Register Numbers on account of duplication (between February 2000 and November 2001). Any mismatch of Part A and Part B at this stage would result in ineligible persons being selected or eligible persons not getting selected. There was no documentation to

Risk of loss of data relating to marks

show how the Commission ensured that the new barcode number allotted for Part A was the same for the corresponding Part B

- Of the 395079 answer sheets scanned between February and November 2001, 3024 answer sheets were rejected. There was no documented procedures regarding method of valuation of rejected cases and treatment of such cases to ensure uniformity in valuation
- At the stages of determining the mark range and short-listing of the candidates, the data was copied to a CD/floppy and the data in the hard disk was deleted later. There was no mechanism to ensure that the data/shortlist was finally deleted from the hard disk. Moreover, keeping backups in easily corruptible media like floppies and fragile media like CDs poses a risk to recovery of data when needed without scanning the answer sheets again.

3.3.26 The Commission stated (September 2005) that there was no risk for the System as there were specific instructions for each and every minute item of work. The reply is silent on controls adopted for reconciliation of number of Part A and B answersheets scanned and to avoid mismatch of barcode numbers in the event of duplication.

General IT Controls***Absence of Business Continuity Plan Controls*****Loss of data due to absence of backup policy**

3.3.27 As part of business continuity plans, the organisation mirrors the database pertaining to the application forms in REACT into the second hard disk, inside the same system, instead of mirroring it in an off-site location or backing it up in any media for storing it off-site. The adopted procedure was faulty, as was evident from the experience in the District Office, Kollam where both the mirrored copy and hard disk were corrupted, resulting in loss of data during May 2004. Despite this, the organisation was yet to change the existing system of backing up the data.

3.3.28 In response to an audit query (February 2005), the Secretary stated (May 2005) that CD writers had since been installed in District and Regional offices for backup. The reply is not tenable as no off-site backup was contemplated.

Absence of Physical and Logical Access Controls

3.3.29 Effective functioning of server requires that it is kept in a cool, dust free environment, with physical access restrictions. However, it was seen that no such provision exists in District Office, Thiruvananthapuram, where the server containing the application data and the nodes were kept in a hall near the entrance, without any access restrictions. The Commission stated (September 2005) that the execution of civil and electrical works took more time and hence the computers were placed in an open space. Subsequently, they had been relocated to safe and dust free locations.

3.3.30 The organisation did not have a password policy, though logical access controls were provided at application level. The Secretary stated (May 2005) that necessary guidelines had since been given to the staff during training and that access controls were being enforced. A Password Policy was needed for effective control in a system claimed to be of utmost confidentiality by the Commission.

Conclusions

3.3.31 The KPSC lacked a clear IT strategy for implementation of Information Technology in its operations which resulted in spending huge amounts without getting the full intended benefits. The process of scanning on which depend the results and the fate of candidates, is not made completely immune from avoidable human intervention. As per the details furnished (August 2005) by the Secretary, the pendency of application had been brought down from 83.50 lakh (1999-2000) to 37.32 lakh (2003-04). As there was substantial increase in the number of applications disposed of during 2002-03 (35.71 lakh) and 2003-04 (36.52 lakh) due to the OMR processing of answer sheets, it is evident that the pendency can be brought down further through effective utilisation of REACT and scanning of applications in OMR format.

3.3.32 Recommendations

- ★ Incomplete maintenance of log book relating to scanning of answer sheets is a risk area which should be immediately rectified.
- ★ Proper IT strategy may be framed covering organisational aspects and use of IT assets in order to have better monitoring of the IT processes and proper utilisation of automated solution like REACT.
- ★ IT Security Policy including physical and logical access control may be devised, documented and implemented.
- ★ The Commission may evolve an effective backup policy after doing a risk analysis.