

AGRICULTURE DEPARTMENT

3.7 Ineffective computerisation in Agriculture Department

Highlights

- **Computerised systems like the ‘File Monitoring System’ and ‘Personnel Information System’ were discontinued due to lack of a long term IT plan.**

(Paragraph 3.7.8.1)

- **The District Offices did not have enough manpower to gather 1,300 items of data each week for the computerised Monday Message Monitoring System.**

(Paragraph 3.7.8.2)

- **Failure to follow programming life cycle resulted in deficient and erroneous application software being implemented. Errors in the application software remained uncorrected for more than two years.**

(Paragraph 3.7.9.1)

- **Due to defective system design, several items of information that were already available in the system were captured repeatedly resulting in errors.**

(Paragraph 3.7.9.3)

- **Of the 13 output statements of the MMMS, 10 statements printed with unauthenticated corrections.**

(Paragraph 3.7.10.2)

- **An amount of Rs 3.02 crore released by GOI in May 2006 for AGRISNET scheme remained unutilised and is transferred to a Personal Deposit Account.**

(Paragraph 3.7.12.1)

3.7.1 Introduction

The objective of the Department is to increase agricultural productivity through optimum utilisation of available land and water and by giving quality inputs, latest appropriate technology and other assistance to farmers. The Department was to ensure the supply of quality seeds, crop nutrients,

pesticides etc., and educate the farmers on crop diversification, market-driven crop cultivation, pest management, water management etc. The Department plays such advisory/support role, based on the computer data collected through the District offices. The overall financial outlay of the Department (2006-07) was Rs 978 crore.

3.7.2 The computerisation

Apart from minor functions like Payroll, File Monitoring and Personal Information System, the major function computerised is called the Monday Message Monitoring System (MMMS). Information on crop coverage, rainfall, availability of surface water, seeds, fertilizers, pesticides, etc., was captured in the computer system. Data is fed by the district offices on a weekly basis, using a web-based application developed by National Informatics Centre (NIC), Chennai and stored in a central server at NIC Chennai in a SQL database. Standard reports are generated by the Commissionerate from the data on a weekly basis, which form the input for the Department to carry out its basic functions and for the information of the State Government and the Government of India.

3.7.3 Scope of audit

As the payroll function was confined to head office alone and file monitoring and personnel information systems were not in a full functional use, it was decided to concentrate on the computerised MMMS, which was in line with the overall functional objective of the Department. Data from October 2004, the date of inception of computerisation, to March 2007, the commencement of audit, was taken up for examination.

3.7.4 Audit objectives

As MMMS had a direct bearing on the functional activity of the Department, a check of the correctness of data gathered at the field offices, followed by the correctness and completeness of data captured and reports generated therefrom, were to form the main objectives of the review. Thus the objective of audit was to check whether

- computerisation was in line with the objectives of the Department,
- district units which were responsible for the feeding in of data, had a definite methodology for collecting information on a weekly basis,
- data fed in at the districts was correct and complete,
- the information in the database was reliable, and,
- the reports generated were correct and utilised for the pursuance of the Department's objectives.

3.7.5 Audit criteria

The audit criteria adopted were to check the

- data for its completeness against the number of districts and the number of entries required there from on a weekly basis,

- data for its correctness with reference to their logical range and reference to other existing data,
- correctness of the data fed to the system against the original source documents,
- data with similar data available with other departments like the Public Works Department and the Meteorological Department,
- application programs for the adequacy of controls, and,
- outputs of the system for their correctness and utility value.

3.7.6 Audit methodology

The audit commenced with an entry conference with the head of the Department followed by a scrutiny of files relating to computerisation at the Directorate. Three district offices¹ were visited to study the systems and procedures prevailing for capture of data in the computer system. A questionnaire was circulated to all the 28 district offices to ascertain the procedures followed in the collection/capture of data and the constraints faced. The data available in the NIC server was obtained as an MS Access database and examined using CAATs for its adequacy and reliability. The provisions and controls available in the application software were ascertained through an examination of the data entry screens.

3.7.7 General controls

General controls relate to the environment within which the development and implementation of the IT Systems are carried out. Objective of the controls are to ensure that IT Systems are developed, implemented and maintained effectively. An assessment of these controls indicated deficiencies as brought out hereunder.

3.7.8 Organisation and management controls

3.7.8.1 IT policy

Though the Department had started using computers commencing from 1994, it does not have an IT policy. Even after 14 years since the commencement of computerisation, the Department does not have a long term IT Plan encompassing a comprehensive strategy for computerising all the functions of the Department. Systems like the ‘File Monitoring System’ introduced in August 2004 and the ‘Personnel Information System’ introduced in April 2005 are not in operation (March 2007) rendering the efforts put in, unproductive. Central funds intended for computerisation remained unutilised as detailed in paragraph 3.7.12.1 of this Report. As the Department undertook computerisation with a view to achieve its objectives and is dependent on the same for its functional activities, it was imperative for it to have an IT policy.

For want of an IT Policy software that were already implemented were discontinued.

¹ Thiruvallore, Kancheepuram and Vellore.

3.7.8.2 *Feasibility of computerisation of MMMS*

It was not feasible to gather all the 1,300 items of information required for MMMS each week due to manpower

For the purpose of MMMS, data to the end of each Friday was to be posted in the computer system by the subsequent Monday. Each district office did not have required machinery to collect and post a minimum of 1,300 items of information through 21 data entry screens each week. To cite a few examples, data on stock position of fertilizers had to be obtained from over 12,800 stockists in the State on a weekly basis, which proved impossible. Further, the inability to obtain rainfall information from 480 different rain gauging stations each week left the related information 45.36 *per cent* (27,868 items out of a total of 61,440) incomplete. Only three to five Agricultural Officers were available for the task in each district and were to carryout the task of collection and feeding in of the data into the system in addition to their regular duties.

Information on 'area coverage under different crops' was available from the Revenue Department and 'water storage position in tanks and reservoirs' from the PWD and 'fertiliser stock position' from its dealers only on a monthly basis. Hence, in respect of these items, the district offices fed only estimated data week after week.

Feasibility of gathering actual data for posting to the computer system for a week on the last day of the same week and the methodology there for was not considered and factored in, when the computerised MMMS was initiated.

3.7.8.3 *Business continuity planning*

The data is under the control of NIC and the users do not have any service level agreement with NIC even for the purpose of business continuity.

Though the software was developed by NIC and implemented in October 2004, the data and the source code are still under the custody of NIC. The owners of the data, the Agriculture Department, do not have any service level agreement with the former to ensure the confidentiality of the data, its security and availability. In the absence of such provisions, the users did not have an absolute control over their data and the business continuity of the MMMS package was thus, not ensured.

3.7.9 *System development controls*

3.7.9.1 *Programming life cycle not followed*

The web based application for the MMMS had not gone through the regular process of a system development life cycle. No user requirement specification had been drawn up and put on record. The developer had been allowed to develop the required software without a systematic study of the requirement, resulting in the eventual application being erroneous and deficient on several counts.

The Department had implemented MMMS without any acceptance testing. As a result, the software in use was deficient and erroneous in design and logic and lacked controls. After using it for over 32 months (October 2004 to May 2007), the application still contained the deficiencies and errors that existed when it was taken over by the Department. No effort had been made at any stage for either improving the software or incorporating necessary corrections.

3.7.9.2 *Defective system design – vital information ignored in MMMS*

The computerised MMMS has been evolved to improve agricultural productivity using the technical capability of the department. However no provision has been made to hold data in respect of the following critical areas.

- Quantum of the total production of different agricultural products which is one of the factors to gauge the performance of the Department and the agricultural community,
- Though the Department has to advise agriculturists on pest control, no effort has been made to store data relating to various types of pest attacks on different crops, remedial action taken, etc., and,
- Six statements forming part of MMMS relating to ‘Area under Paddy in the Cauvery Delta’ could not be generated through the computerized MMMS, as the system did not provide for the storage of relevant information.

In the absence of such information, the Department resorted either to keep such information out of their MMMS or supplement the same manually.

3.7.9.3 *Defective system design - capture of information already available*

The computerised MMMS provided for capture of some data/ information that was either already available or that could be derived from the data already available. Some specific instances and the resultant effects thereof are brought out hereunder.

- Area covered by each crop during the previous year was fed in again, despite the availability of the information in the database. This resulted in 330 errors in a test check of two years’ data containing 804 records,
- Values for both ‘weekly rainfall’ and ‘cumulative rainfall up to the end of the week’ are required to be fed in independently,
- Permanent data like ‘capacity of a reservoir’ and ‘annual physical target in respect of different schemes’ are required to be fed in each week,
- The current storage position and the corresponding position of the previous year for all reservoirs were to be fed in each week, despite the availability of the information in the database. A test check of 1910 records relating to the year 2006 disclosed errors in 637 records,
- The current area under paddy was compared with the normal area under paddy in respect of each district. The normal area which was constant for the whole year was fed in every week resulting in 927 instances where the data was incorrectly fed in,

Due to faulty design of MMMS, data already available in the system and data that could be calculated were unnecessarily fed to the system giving room for errors.

- The closing stock position of fertilizers of a week was required to be fed in again as the opening balance of the subsequent week instead of automatic carry over by the system, which could avoid errors, and,
- Instead of data entry of expenditure during the week alone and allowing system to deriving the other parameters such as expenditure up to the previous week, up to the end of the current week, the percentage of expenditure relating to schemes, such information were manually fed into the system resulting in:
 - 1,333 instances where the expenditure at the end of the current week was greater than the expenditure up to the end of the previous week plus expenditure during the week,
 - 1,045 instances where the expenditure at the end of the current week was less than the expenditure up to the end of the previous week plus the expenditure during the week, and,
 - 656 cases where the expenditure at the end of the current week was less than the expenditure up to the end of the previous week.

Inefficient system design requiring unnecessary/repeated data entry resulted in errors apart from wastage of time and manpower.

3.7.9.4 Inadequate database design

The database design in MMMS was inadequate to meet the departmental objectives and had inconsistencies as brought out hereunder:

The design of the database was inadequate for meeting departmental requirements.

- The Department monitors the targets relating to the cultivation area under paddy separately for the Kharif and Rabi seasons. Though the system was designed to capture the respective targets separately, it did not have provision to capture the achievements separately. This required manual intervention to split the consolidated achievement fed in for reporting purpose.
- The stock position of pesticides were to be captured under two categories namely 'Dust' and 'Liquid' under the caption 'Plant Protection Chemicals'. The database however was designed to accept values for three entities including the caption without the necessary relational constraint. Data was fed in under all the three headings rendering the related figures incorrect.

3.7.9.5 Post-installation evaluation and feedback

For want of post-installation evaluation and feed back, errors in the system remained uncorrected for more than two years.

The computerised MMMS did not undergo any post installation evaluation and there was no provision for obtaining any feedback on its functions with a view to enable rectification of errors in the system. As a result the software had deficiencies as brought out hereunder which remain uncorrected even after two years of functioning.

- (a) The Department had to maintain supply of fertilizers and pesticides by ensuring adequate production and a comfortable stock position. For this purpose, the Department forecast the requirement of different fertilizers for a

month to ensure their production/supply. The estimation however was grossly off the mark, considering the actual consumption during the period.

(b) In order to monitor the productivity of paddy per unit area, the Department declared certain agricultural fields as experimental fields in each district and studied the maximum, minimum and average quantum of yield per hectare. For this purpose, each district fed weekly data on the maximum, minimum and average yields from amongst the experimental fields to the MMMS. However, due to faulty design, the system furnished the sum total of the maximum yields in all the districts as the maximum yield in the state and followed a similar logic for assessing the minimum and average yields as well.

For want of a post-installation evaluation and feedback, these errors in the software remained undetected and no efforts were taken by the Department to get these basic errors and deficiencies corrected in the software.

3.7.9.6 Documentation

No documents detailing the objective of the computerised MMMS, its coverage, procedures to be followed, benefits anticipated there from, etc., were available and produced to audit. Despite having a vast number of users across the districts, no user manual or instructions were available for their guidance.

3.7.9.7 Training

In each district, the Agricultural Officers were in charge of the collection and feeding of data in the system. However, these officials were not given any training on the usage of the application software and the type of data to be fed in. Lack of training resulted in

- some districts fed data pertaining to current week while others fed cumulative data;
- different districts using different units during data entry, like some districts fed the price of paddy seeds on per kilogram while some others fed the price on per ton basis; some districts fed the area in ‘lakh hectares’ while others fed the same in hectares’;
- Some districts did not feed in all the data required.

This non uniformity made the data unreliable. The absence of a user manual further compounded the errors in the data entry.

3.7.10 Application controls

3.7.10.1 Input controls and Validation checks

The computerised MMMS did not have sufficient input controls and validation checks to ensure completeness of data fed into the system and correctness of data against existing data as illustrated hereunder

- The Department kept track of the water storage position for around 35,000 tanks and 48 reservoirs. The number of tanks for which the storage position was reported, varied week after week indicating that the data was incomplete
- Provision was created for the capture of data on Control of Eriophyid Mite in Coconut, subsidized and non-subsidized biocides, production of Jatropha, Sweet Sorghum and Sugar Beet. But no data entry was done in respect of these items.
- With regard to monitoring of the progress of schemes, several districts did not enter data relating to physical achievements in intervening weeks.
- Figures relating to area under paddy cultivation not falling within the logical range were fed into the system. For example, the area under paddy was fed in as 15,198 lakh hectares against a target of only 21.70 lakh hectares.
- In 39 instances, the storage position of water in reservoirs was fed as more than their total capacity already available in the database.
- A select number of fertilizer samples were sent for analysis and the results of the same were watched through MMMS. However, as per the data base, in 835 instances, the samples analysed and results obtained were more than the samples taken for analysis.

3.7.10.2 Output control - incorrect reporting

The ultimate output of the MMMS is a set of 13 major reports generated by the system, which are used in making policy decisions at the Directorate and also for communication to the other apex bodies in the Government. Despite the same being the ultimate output of a series of processes involving people from all districts, the system-generated outputs were largely undependable.

Out of 13 MIS reports, in 10 reports manual corrections were carried out in the output. As these corrections required almost the same quantum of input as originally required for and in the absence of necessary mechanism to obtain such input in the Directorate, the corrections were made with unauthentic figures. Thus, the eventual output of the system had been allowed to remain with errors or presented with a set of assumed figures.

3.7.11 Reliability of Data

A test check disclosed that the figures available in the MMIS were different from figures of the Meteorology Department which keeps the data relating to quantum of rainfall received. Similarly, in 265 instances, the storage position of reservoirs furnished under MMMS did not agree with similar data maintained in the Public Works Department.

For want of output controls the eventual outputs of the system contained errors and the correction made contained un-authentic figures.

Rupees 3.02 crore released by the GOI for implementation of AGRISNET scheme remained unutilised for 16 months and stands transferred to a PD account.

3.7.12 Other points of interest

3.7.12.1 *Non-utilisation of government funds for computerisation*

The Department of Agriculture, had requested the Government of India for the sanction of Rs 40.60 crore for implementation of the AGRISNET scheme designed to supply computers, application software etc., to the Block/Taluk level officers of the Department, for the benefit of the farming community. Government of India sanctioned a sum of Rs 8.31 crore (March 2006) for the scheme as a whole and Rs 3.02 crore towards the first installment. They placed at the disposal of the Government of Tamil Nadu an amount of Rs 1.32 crore (March 2006) and Rs 1.70 crore (May 2006). The total amount of Rs.3.02 crore was made available to the Department in October 2006. The first phase of the project was to be completed in 12 months commencing from March 2006.

While there was a delay of over five months in the release of the Government of India Funds by the Government of Tamil Nadu, no action was initiated towards implementation of the Scheme by the Department even after seven months of the release of the fund. The amount had thus remained locked up with the Government of the state for five months and the Department for another seven months and none of the contemplated benefits either to the department or the farming community had accrued. With a view to avoid lapse of the fund, it had been drawn (March 2007) and placed as a Personal Deposit outside Government Account violating financial regulations.

3.7.12.2 *Incomplete development of Website*

The Government sanctioned (May 2005), Rs 5 lakh for the development of a web site for agriculture information, accessible by agriculturists using equipment available with RASI (Rural Access to Services through Internet) project implemented by Department of Rural Development. The site was to include static pages like Policy Note, Crop Production Guide, Agriculture Strategy Plan, etc., and dynamic pages on 84 subjects like Weekly Reporting System, Monitoring and concurrent evaluation, Season-wise crops, etc. The contract for development of the website was awarded (February 2006) to “Messrs Maruthi Computers Private Limited” at a cost of Rs 5 lakh through a limited tender.

The company had developed only the static pages of the site. However, despite the incompleteness, the Department had paid the full amount, intended for a complete development. The facility of the Agriculturists accessing the site through RASI had also not been made available till date (June 2007). The website as on date contains only static information open to the public. Thus, due to faulty planning and execution by the Department, the intended benefit to the agriculturists had not accrued despite an expenditure of Rs 5 lakh.

3.7.13 Conclusion

Though computerisation in the Department had commenced in 1994, there exists no long-term strategic IT plan aimed at achieving their functional

objectives. Computerisation of the MMMS commenced in October 2004 without a feasibility study and without going through the full course of a System Development Life Cycle. At the districts, there existed no mechanism for timely collection of all the required data. The NIC developed software was deficient and required feeding several items of either already available data or derived data, which combined with the lack of input and validation controls, resulted in a deficient and un-reliable database. Despite more than two years of usage, the owners of the data did not at any stage attempt to have the defective programs or the deficient database rectified. Corrections were done only on the outputs leaving the database erroneous. The final output of the MMMS containing erroneous and modified figures on a large scale is authenticated by the Director and communicated to the Government of India, the Government of Tamil Nadu and many other high offices.

Thus, the computerised MMMS, after incurring an expenditure of Rs.1.99 crore on hardware, involving a vast number of departmental staff and being in a functional state for over two years had not been able to provide the right information to the Department and the policy makers alike. An amount of Rs 3.02 crore released by the Government of India for computerization remained unutilised for over a year. The Department while accepting all the observations of audit conveyed their decision to revamp the entire MMMS and make it dependable.

3.7.14 Recommendations

- As computerisation is critical to the departmental functions, the department should frame a long term IT plan as a part of IT Strategy and the corresponding component-wise computerisation with a time frame.
- The district units responsible for the collection and feeding in of the data should be provided with adequate mechanism for the gathering of the weekly data and their reliability leaving no room for assumptions.
- The deficiencies in the program may be taken up with NIC who had developed the software
- The completeness of the data and its correctness should be checked through the provision of adequate input controls at the data entry stage and appropriate validation controls.
- Any modifications or additions should be allowed only through the system under appropriate authentication and authorisation, rather than on the output already generated through the system.

The above points were referred to Government in June 2007; reply had not been received (November 2007).