Chapter

12 IT Audit of NREGASoft

12.1 Introduction

The Operational Guidelines envisage extensive use of information technology (IT) in planning, execution and monitoring of all the vital aspects of the Scheme. Use of IT has been specified in all the stages, *viz*.,

- planning to execution of projects/works undertaken;
- enrolment to employment and payment to workers; and
- transfer of funds to accounting of expenditure.

IT tools were to be used for increasing efficiency and enhancing transparency of operations. The Operational Guidelines further elaborate that IT would be used in the areas of communication, access to information, grievance redressal and in monitoring and evaluation. It was also thought that a database of works, resource requirements, registered households, payment of wages, persondays of employment provided and funds received and expended at different levels would be created as a crucial part of the IT initiative under the Scheme.

National Informatics Centre (NIC) was engaged by the Ministry in 2005 to develop a system to fulfill the above IT requirements. This web based software or Monitoring and Information System working through the Scheme's official portal[1] provides facilities such as data entry, authorization (of works and expenditure), and monitoring and common information access to all the stakeholders and functionaries of the Scheme. NIC stated that all the information related to the Scheme was being managed online through this system which was currently generating approximately one GB data daily, as input from the stakeholders. The database has a total volume of about two terabytes of data.

The importance of the Monitoring and Information System/NREGASoft can be seen from the application of the information contained in the software. These include:

- internal monitoring by the Ministry;
- fund release to the states/districts;
- response to Parliamentary questions;

[1] http://www.nrega.nic.in

- generating data for various performance reports like MGNREGA Sameeksha; and
- voluntary disclosures and providing information under RTI.

In addition, the MIS was the only source of consolidated information on the Scheme which was readily available in the public domain. NREGASoft was widely used by the beneficiaries, research organizations, academicians and other stakeholders.

12.2 Objectives of IT audit

An Information Technology Audit (IT Audit) of this software was undertaken as a part of performance audit of the MGNREGS to examine whether the software is:

(i) able to incorporate all the necessary controls and user roles;

(ii) able to ensure proper accountability of all the functionaries making/ authorising entry;

(iii) able to correctly record and report all the facts about physical progress in areas of works undertaken, workers engaged, wages paid, assets created and income generated;

(iv) able to correctly record and report financial figures and whether the financial figures recorded by the software corroborate the data of physical progress; and

(v) being used by all the stakeholders in the manner required for proper functioning of the Scheme as per the Act.

12.3 IT Audit Methodology

12.3.1 Examination of Website

As the system was primarily based on inputs by users through the website at different levels of the implementation hierarchy, the Scheme website http://www.nrega.nic.in was examined with a view to gain knowledge of the volume, veracity and velocity of information flow. Input forms on the website were examined to ascertain whether these provide information/ capabilities necessary for normal functioning of a user for its role in the implementation hierarchy. It was also examined to see whether the software was able to protect privacy of information held by different users. Input forms were also checked to ascertain presence of input controls to filter out data not conforming to valid values.

12.3.2 Examination of Data

Data generated in the implementation process of the Scheme gets collected in NIC servers and is used for preparing all the summary reports available on the NREGASoft website. This data is also used for generating information necessary for monitoring and evaluation of the vital aspects of the Scheme. Relevant tables of the database were checked by Audit to ascertain accuracy of information being used for the decision making process. The following aspects were covered during the data analysis.

a. tests to check whether various interrelated elements of data conform to accounting logic.
b. tests to check whether various elements of data depict valid information registering actual progress of work.

12.3.3 Observation and Interview

Members of the NIC team responsible for development, maintenance and upkeep of this system were interviewed and were given questionnaires through audit memos for ascertaining their awareness about risks related to consistency, fault tolerance, scalability, efficiency and economy of a database system of this scale. It was also ascertained from the NIC team if the system was able to withstand common threats posed by modern day internet public domain environment.

12.4 Audit Findings

12.4.1 Ambiguous Users Entering/Authorising Data

In order to ascertain accountability and fix responsibility in data entry/authorisation tasks, the Operational Guidelines specify that *"There should be a system of authentication of data to clearly identify the person who prepares and scrutinises the data and the date on which such data is prepared and scrutinized."* To fulfil this operational requirement "entry by" Column (in all the major tables) and "authorised by" column (in Registrations and Applicants Tables) were created at the stage of designing the software. However, during examination of data relating to work progress, it was noticed that in substantially large number of records *viz*., 56,24,004 records in 20 states, **(Annex-12A)** these columns were either left blank or had been filled with ambiguous data such as "Guest", "Test", "Computer IP address", numbers or single/double alphabets, etc. Thus, it was not possible to identify users and to trace back transactions to the originator. The software did not have a system to uniquely identify all users and ensure that data entry was permitted only to authorised users. Hence, it would be very difficult to fix any responsibility for erroneous data entry – deliberate or otherwise. This indicated a weak control arising from a serious flaw in software design and implementation.

The Ministry stated that NREGASoft application visualized unique "user id" and password for stakeholder institutions and contained a mechanism to capture identity of institution and entry date. Further, "entry by" field existed in the system for institutions with multiple users. While recognising the problem of incorrect/ambiguous users, the Ministry stated that an offline module and online mechanism of tracking IP address along with "entry by" were enough to take care of audit observations.

The reply of the Ministry was not in consonance with the Operational Guidelines which clearly envisage identification of person responsible for preparing and scrutinising data. This was not possible from the present data recorded by NREGASoft. Additional provision of IP address tracking can only provide location of data entry or authorisation and it was not a method for identifying users. Under the circumstances, there was a risk of collusion between a few stakeholders for fudging source data.

12.4.2 Invalid Beneficiary, Works and Work Progress Details

Large online databases, like the NREGASoft, usually have a large number of validations and checks which work in the background. The purpose of such checks is to:

- ensure that only complete and valid information entered the database;
- throw up warnings whenever erroneous data was entered; and
- generate periodic reports on the validity and authenticity of data on pre-determined parameters.

Analysis of data contained in NREGASoft revealed that the software not only accepted invalid and incomplete information but also failed to generate any alerts on occurrence of such an event. Following instances were noticed during audit:

- Ambiguous/invalid names (containing either numbers or special characters) of registered beneficiaries (1,23,849 records in 18 states). Details are given in **Annex-12B**. Thus, it would not be possible in these cases to cross verify names of registered persons with other databases such as Election Commission, Census, BPL Census, etc. The data, in these cases, was also unsuitable to check instances of same beneficiaries obtaining registration more than once.

The Ministry stated that the NREGASoft was Unicode enabled which provides support to local languages and uses keystrokes other than [a-z] character set. Hence it was not possible to restrict the field to [a-z] character set. Due to this feature special characters sometimes got added to the names without the knowledge of data entry operator. While recognising possibility of multiple job cards with same name, the Ministry stated that a report existed in the system to identify and report these cases to state governments.

The reply of the Ministry fails to explain existence of single or double letter names, sometimes containing special characters only **(Annex-12B)**. Moreover, the reply of the Ministry that special characters get added to names even without knowledge of data entry operators indicates a serious design defect in data entry module. Names of beneficiaries having special characters cannot be electronically verified with other sources of data or bank record. By using this data, it would also not be possible to identify multiple job cards erroneously issued to same beneficiaries as a name would never match name with special characters.

- Audit observed missing/invalid house numbers (6,42,14,836 instances in 19 states) of registered households. Details are given in **Annex-12C**. In the absence of valid house numbers, it would not be possible to ensure physical availability of beneficiaries. The data, in these cases, was unsuitable to check whether the registered beneficiary was a local resident, as was required under the Act.

The Ministry stated that the field 'house number' had not been kept mandatory in the system as in some villages, there may be houses without numbers. Further, village code, panchayat code, block code and district code which are part of job card numbers were enough to depict residential status of beneficiary.

The Ministry's reply that some villages may have houses without house numbers does not appear correct as the number of missing/invalid house numbers (over six crore) indicate that this data was not being entered / erroneously entered in a large *per cent* of cases. Absence of valid house numbers render the data unsuitable for immediate survey of beneficiaries and, coupled with invalid/ambiguous names, it makes the system susceptible to the risk of non entitled persons getting benefit of the Scheme.

- Cases of missing plot number/ *'khata'* number of the work in progress (53,08,149 instances in 20 states) were observed. Details are given in **Annex-12D**. In the absence of valid plot number/ *'khata'* number, physical progress of works could not be verified. Moreover, it renders data unsuitable for checking instances of same work being carried out at same place repeatedly.

The Ministry stated that the fields 'khata number' and 'plot number' had not been kept mandatory in the system as some works were also being done in fields which had not been surveyed. While recognising the problem of duplicate works, Ministry had stated that fields for latitude/longitude or the worksite had been provided which were being recorded on a pilot basis in 17,226 works in Gujarat.

The Ministry's reply did not fully acknowledge the issue raised by Audit. The large numbers of works without '*khata* number' /'plot number' indicate that the problem was not limited to some works that were being carried out in fields not yet surveyed. Despite recognised risk of duplicate works and availability of cost effective GPS coordinate recording tools, pilot project involving only one state indicate a lackadaisical approach in mitigating a recognised risk. Data in its present form was not suitable for any survey of works actually undertaken or checking instances of same work being shown as carried out at same place repeatedly.

- Cases of missing/duplicate financial sanction number in relation to the works sanctioned (13,59,816 instances in 17 states) were observed. Details are given in **Annex-12E**. Absence of any checks to compulsorily require financial sanction or restrict duplicate financial sanction number renders the data unsuitable for mapping financial sanctions vis-a-vis the works carried out.

The Ministry stated that it was technically possible to have duplicate financial sanction number but it categorically stated that there could be no situation where financial sanction number was absent.

However, while re-examining data in the light of the Ministry's reply, 46,893 cases **(Annex-12E)** of missing/ambiguous (nil, 0,00 or one or two special characters) were observed in test checked data.

- Cases of missing work name in sanctioned works (46,06, 482 instances in 18 states) were observed. In the absence of work name, physical progress of works could not be verified. Details are given in **Annex-12F**. Moreover, it renders data unsuitable for checking instances of same work being shown as different works.

The Ministry stated that all details of works including name were maintained in the work master table which was accessed by other tables using the work code. In order to meet some functional requirements work name was added to work sanction table at later stage.

The reply of the Ministry was not convincing due to the large number of missing names as a result of which the intended functional requirements would not be fulfilled. On examination of test data in the light of reply of the Ministry 20,361 instances duplicate/missing work code were observed which shows that no clear link between work and sanction could be established from data in these cases **(Annex-12F)**.

The above instances clearly indicate weak controls in the system as a result of insufficient checks. Absence of such checks and validations raises doubts about the reliability of the data in the MIS. In the absence of a reliable MIS, any conclusion drawn on the basis of the MIS data would be prone to significant errors.

12.4.3 Faulty Programming Logic

A computer based transaction recording system contains programming elements to perform basic calculations and cross check various interrelated bits of information to maintain accurate data. It can also generate alerts about summarily incorrect figures being entered/already entered in the data. During the analysis of data collected it was seen that the software lacked the programming logic even to perform basic calculations conforming to accounting logic. The following instances came to notice during the examination of data:

- 94,56,599 instances in 18 states depicted wrong calculation of wages which could be worked out by applying the logic 'total Wages = Wage Rate X Work Days'. Details are given in **Annex-12G**.

The Ministry stated that the system calculates amount paid to labourers on the basis of wage rate, attendance and TA/DA, wherever admissible, but the field was kept editable to record instances of actual payment, even if it was more or less than the calculated amount. The Ministry drew attention to a report which listed instances where wages were paid more/less than the 'wage rate X attendance + TA/DA' formula.

The logic behind recording amounts other than simple 'wage rate X attendance + TA/DA' formula was not convincing. Moreover, there was a separate field for recording 'TA/DA' admissible to workers in which amount of 'TA/DA' could be recorded instead of merely adding it to total cash payment. Any case of non-adherence to the mentioned formula would indicate that wages were not paid as per the prevailing wage rate. In such a scenario, a system of immediate flagging and time bound reconciliation to correct these errors, wherever these occurred, was expected.

- 1,13,723 instances in eight states depicted wrong calculation of amount of material purchased which could be worked out by applying the logic 'Amount = Rate x Quantity'. Details are given in **Annex-12H**.

The Ministry stated that the system calculates amount using 'Rate X Quantity' logic but the field had been kept editable to facilitate entry of actual figure that may include other levies such as VAT, octroi, etc. The Ministry also drew attention to a report which listed instances where amounts calculated did not match 'Rate X Quantity' formula.

The reply of the Ministry indicates a serious design flaw in material cost recording module of the system as it fails to recognise all the components of costs such as VAT, octroi, etc. Moreover, it also violates the legal requirement of separate treatment of tax elements to enable tax authorities to check instances of tax charged but not deposited by collecting vendor. In the present form of data, miscalculations in bills of material cannot be segregated from cases where final amounts were worked out after including other components of material costs such as VAT, octroi, etc.

- 19,11,102 instances in 12 states depicted wrong balance or wrong entry of closing balance in state, district, block and Panchayat accounts tables which could be worked out by applying the logic 'Closing Balance = Opening Balance + All Inflow – All Outflow'. Details are given in **Annex-12I**.

The Ministry stated that there were two types of opening balances (closing balance of previous year and audited opening balance) appearing in MIS which were derived using different methodologies. The Ministry further stated that in many states the opening balance entered in the MIS for financial year 2012-13 also differed from opening balance shown in utilization certificates of states for which corrective action was being taken.

The reply of Ministry was not convincing as adoption of different methodologies shows the absence of a clear accounting logic. Moreover, the differences between the opening and closing balances along with non-reconciliation of such balances with the UCs render the entire financial data suspect and unusable.

The absence of such basic programming elements not only increases the burden on the persons making the data entry, but also leaves scope for arbitrary decisions by them leading to avoidable errors. The large number of errors, due to the absence of programming elements, adversely affect the reliability of the data. The quantum of each error may be small; however, such a large number of errors in test checked data would imply that when seen in totality, small errors would have a compounding effect.

12.4.4 Inadequate Training to Ground Level IT Personnel

Training was necessary to educate the users of the software on its criticality, relevance and the scope of their work and to sensitise them about possible errors and the implication of such errors on the whole system. Proper training to data entry operators was particularly essential as it would help avoid several simple mistakes during the conversion of paper records to computerised records. Audit noted that data was entered by persons not aware of the working of the programme and who were not conscious of the impact of common entry errors.

During the analysis of the data, it was noted that the units measuring the work progress in respect of rural connectivity, water conservation, flood control and drought proofing, etc. were often misunderstood by the data entry operators and entries recorded were inconsistent. For instance, data entry in respect to the length of roads made under each work was, at times, done considering the units as kilometres and at other times considering it as metres. The figures recorded in table ranged from less than one to more than 1,500. Thus, if the unit was assumed to be kilometres then it would mean that the roads measuring more than 1,500 kms were made under a single work under MGNREGS. Incidentally, this would be more than the distance between Delhi and Mumbai. If the unit was assumed to be metres then it would imply roads measuring less than a metre were also made. Both the situations would be implausible. Similarly, figures in the financial management module appeared to be in lakh and on other occasions in thousands of rupees. The values in the total distance of road constructed for rural connectivity, in nine states, is shown in the table below:

Table-18: Stratified distances of Road as recorded for Rural Connectivity.

Recorded Total Distance	Number of Records
Less than One	9,25,274
1 to 5	2,59,928
5 to 10	87,703
10 to 15	3,408
15 to 50	3,199
50 to 100	3,397
100 to 1,000	9,618
1,000 to 1,500	1,279
More than 1,500	1,121

As the above table shows, if the unit of measurement was taken as kilometres, there were 1,121 instances of roads more than 1,500 kilometres being created under MGNREGS. Similar instances of apparent ambiguity existed in measurements recorded for water conservation, flood control and drought proofing work.

Audit thus noted that the data in NREGASoft could not be relied upon for understanding the extent of the progress of work and to ascertain the details of assets created.

In reply to the Audit observation the Ministry furnished details of training efforts at various levels. Ministry also intimated that a check had been effected to limit units which were above work parameters from being entered.

However, the fact remains that persons actually making data entry and authorising this data were not aware of basic elements such as units of measurement used in data entry module which had rendered the data unsuitable for measuring various performance parameters.

12.4.5 Manipulation of Data without Reference to Source Documents

The Operational Guidelines specify that *"data entry should be done not above the block level and documents should not be taken outside the block"*. The reason for this provision was that all basic records existed at the block or lower level. Any data entry or modification beyond the block level would be without access to these records.

It was seen during audit that the Ministry passed on a copy of the MIS data sets to the state governments for their internal use after the closure of data entry for the relevant year. During the course of audit, the MIS data sets were also obtained from the State Rural Development Departments, in the case of Karnataka and Odisha. Comparison of the data provided by the Ministry and that available with the state governments revealed unauthorised instances of deletion of data and revision of values in certain cases. Some instances are outlined below:

- Data related to total amounts paid for material purchase pertaining to Karnataka for the period 2008-2011 made available by the Ministry appeared to have been changed in 3,562 cases.

- In the case of Odisha, it was seen that the muster roll data provided by the Ministry showed 57,780 less people as having worked when compared to the data provided by the Odisha State Rural Development Department. This also led to a reduction of 6,10,331 persondays of employment being generated. An analysis of the data showed that the records were deleted at one go. This would imply that the deletion was not based on field records.

- It was seen that some entries in the muster rolls which showed people working at multiple job-sites simultaneously were also deleted from the Central MIS. Interestingly, in such cases though the job card number was blank, the payment column still showed the payment made to such beneficiaries.

- In many cases of underage beneficiaries, appearing in State Rural Development Department data of Karnataka, the age of these beneficiaries had been updated to 18 years in the database supplied by the Ministry.

The Ministry spoke of a number of situations necessitating change in data at the backend and admitted its awareness about non-reliability of data of NREGASoft. Efforts of Ministry to share data with states and incidences of mismatch in records reported by states had also been elaborated by the Ministry. The Ministry also stated that state Database Base Administrators (DBAs) also had the right to delete or update records in shared backup and they could also recall the deleted records. The Ministry also mentioned incidents of change/entry in data pertaining to 2009-10 and 2010-11 were carried out by the state governments or on request received from them.

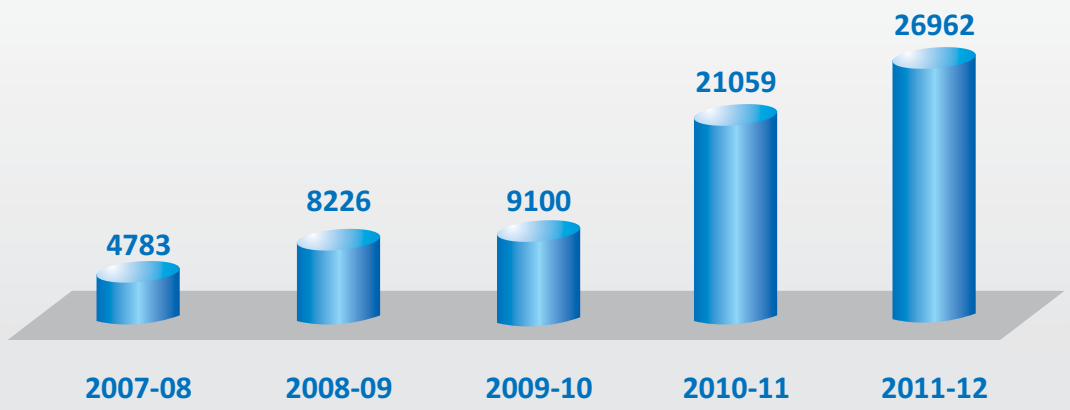
A request was forwarded to the Ministry for sharing specific communication from states for deletion/updation/entry of data in cases pointed out by Audit. In reply, the Ministry forwarded a letter from Karnataka government seeking provisions for making entry of pending bills pertaining to 2009-11 period. In case of Odisha, the Ministry mentioned that the state DBA had control to edit/enter the information for all financial years even if state data entry was closed.

The need for such en-bloc changes at the Central level raises doubts on the authorisation of such changes. The lack of a proper audit trail in the software makes it impossible for audit to verify who made the actual changes i.e., the Central DBA or the state DBA. The reply of the Ministry also does not address the issue that higher claims of the state would be based on data which had been modified at a later date without any consequent action. Moreover, en-bloc changes in shared backup data by multiple authorities i.e., state DBAs as well as Ministry authorities raise serious doubts about authenticity of the data.

12.4.6 Absence of Controls to Prevent Data Entry Errors

The instances of erroneous data entry mentioned in para 12.4.5 continued to remain unchecked during the years 2005-06 to 2011-12. This indicates that there was no system of monitoring. This would imply that either NREGASoft did not generate the required alerts in any of the cases reported above or no action was taken to correct the errors. In fact, Audit noted that the rate of errors continued to grow over the years. For instance, increasing incidences of mismatch in opening/closing figures of balances of Panchayat Account Table of Jharkhand shows a clear trend that simple mistakes continued to grow over the years. The trend was prevalent in all the other parameters of Scheme implementation.

Number of Mismatched cases of opening/closing balances in Panchayat Table in Jharkhand State (Closing balance = Opening Balance + All Inflow - All Outflow)



The Ministry stated that a number of alerts were generated by the NREGASoft application to verify job cards, ascertain minimum wage to workers, check material bills on 'Rate X Quantity' criteria, check per day expenditure of gram panchayats and unused job cards.

However, the continuing presence of clear cases of ambiguity in data in aspects related to user identity, account balances, payment calculation, work progress, etc., indicate limited effectiveness of mechanism for action taken on alerts generated by the system.

Recommendation:

The Ministry should examine and reconcile the deficiencies in software design as discussed above, and make necessary changes to the NREGASoft. There is a need to put in place stricter controls for data modification after authentication and closure of data entry.