

~~the West Bengal State Road Development Agency (WBSRDA) was held only in 2003-04 and thereafter no meeting was held as against the requirement of two meetings in a year. Similarly, the executive Committee of WBSRDA met once in 2003-04 and twice in 2004-05 as against the requirement of once in every three months as per the memorandum of association. In Jammu and Kashmir, the state government constituted a monitoring and quality control committee in each district for ensuring effective monitoring but there was no monitoring. In Orissa, the SLA did not monitor the project preparation, verification of correctness of survey and other requirements. Audit noticed inflated reporting of physical achievement to the Ministry in five³ States. Audit further noticed that in Manipur, incorrect progress reports were prepared by PIUs and physical and financial progress reports for phase I works was not submitted to the Ministry as of March 2005, while in Arunachal Pradesh submission of monthly and quarterly progress reports by PIUs was irregular till February 2003. In Haryana, the periodical progress reports received from PIUs were neither scrutinised properly nor did the Engineer-in-Chief (EIC) take effective follow-up-action.~~

4.11 Monitoring through Online Management and Monitoring System (OMMS)

The Online Management and Monitoring System (OMMS) developed for PMGSY was a web-enabled application software for computerized monitoring and management of the programme. The main objectives of OMMS were:

- To create a database of rural roads.
- To track annual proposals from preparation of projects to completion of works.
- To make available a simple and transparent accounting system, and
- To assist in ensuring maintenance management.

The software was designed to generate outputs useful for monitoring and management at the District Programme Implementation Unit (DPIU), the State Rural Roads Development Agency (SRRDA), the National Rural Roads Development Agency (NRRDA) and the Ministry. The information on the progress /status of PMGSY was also to be made accessible to the public through the PMGSY website.

4.11.1 The software comprised several modules encompassing each process of PMGSY as indicated in Table 13.

³ Andhra Pradesh (147 works), Meghalaya (9 works), Punjab (9 works), Rajasthan (65 works), West Bengal (9 works)

| Table 13: PMGSY process and corresponding module of OMMS | | | |
|---|-------------------------------------|---|------------------------------|
| PMGSY Process | Corresponding module of OMMS | Data available in the module | Data to be entered at |
| Preparation of Master Plan | Master Data | Master data related to Districts, Constituents, Blocks, Villages, Habitations, Panchayats, Roads, Contractors, etc. | DPIU and SRRDA |
| Identification of Network | Rural Road Plan | Data related to District Rural Road Plan (DRRP) road data (categorization of National Highway (NH)/ State Highway (SH)/ Major District Roads (MDR)/ Rural Road/ Link routes/through routes) | DPIU |
| Annual Proposal from Core Network | Proposal | Proposals based on the selection of road links from the Core Network | DPIU |
| Tendering of cleared works | Tendering | Tendering data, contractor award details | DPIU |
| Execution of awarded works | Execution and Monitoring module | Progress of works (Physical/ Financial) | DPIU |
| Inspection and Quality Monitoring | Quality Monitoring | Data regarding the Quality Control (QC) inspection carried out by National Quality Monitors (NQM) | |
| Programme/Works Accounting | Receipts and Payment | Accounting data with regard to classified expenditure against each road work | DPIU |
| Maintenance planning | Maintenance | Physical and financial data regarding 5 years | DPIU |

4.11.1.1 The data would reside in the State and Central servers while network connectivity among the District, State and Central Servers was provided. An amount of Rs 20.67 crore out of an outlay of Rs 43.90 crore had been spent till March 2005 on OMMS.

4.11.2 Audit examined the adequacy of internal controls in OMMS using the COBIT⁴ framework to the extent relevant. The data pertaining to OMMS was analysed using SQL⁵ Server and Microsoft Access. The Audit findings are discussed below.

4.11.2.1 There was difference between the figures of total habitations depicted by the database and those reported by NRRDA to the Ministry. The database depicted 8,24,395 habitations while NRRDA reported 8,49,341 habitations to the Ministry. The maximum difference between the number of habitations depicted by the database and the monthly reports sent manually by NRRDA to the Ministry was in **Bihar, Haryana, Himachal Pradesh and Uttar Pradesh.**

⁴ Control Objectives of Information and related Technology published by IT Governance Institute, formed by Information Systems Audit and Control Association, USA

⁵ Structured Query Language Server, a Relational Database Management System, and product of Microsoft.

4.11.2.2 In 6982 cases, the names of the habitations were invalid ('9sjm', '9skm-A', '65', '75', '7H', '3.5 mile', 'a' etc.). Invalid data in master table would cause unreliable MIS being generated by the Application.

4.11.2.3 In terms of para 3.1.6 of Operations Manual for PMGSY, for the purpose of preparation of DRRP all habitations with population of 100 or more persons (as per Census 2001 data) and which were more than 500 metres away from each other was to be identified and listed. The population of all habitations within a radius of 500 metres was to be clubbed together for the purpose of determining the population size of unconnected habitations. However, analysis of the data containing details of habitation revealed that there were 79,758 cases where total population of the habitation was less than 100. Moreover, due to the absence of the provision in the system for incorporating the distance between two adjacent habitations it was not possible to ascertain whether the roads constructed served only the designated habitations.

4.11.2.4 Test check of the records in States revealed that in **Punjab**, computers were not installed in 6 PIUs and wherever installed, these were not put to use due to non availability of trained staff. In **Uttaranchal**, computers were installed in the office of the Chief Development Officer not related to PMGSY and in **Uttar Pradesh**, OMMS was not adopted (October 2005) so far. In **Arunachal Pradesh, Bihar, Jammu and Kashmir, Karnataka, Kerala, Maharashtra, Manipur and Meghalaya** though computers were installed, OMMS was not functional as the data/information of PMGSY works and their progress were not updated/uploaded due to lack of network connectivity and non availability of internet facilities. In **West Bengal**, data had not been updated beyond December 2004, while in **Bihar** data available with PIU was not fed into computers as of March 2005. In **Rajasthan**, preparation of reports/information regarding quality control and accounting had not started as the internet system installed in banks having PMGSY accounts was not yet functional. It was only in **Assam and Tamil Nadu**, that OMMS was operational and the data updation was carried out at the district level.

4.11.3 District Rural Road Plan (DRRP)

The database of DRRP did not contain information about existing roads of 231 districts in 22 States. Maximum number of missing districts was noticed in **Bihar, Jharkhand, Madhya Pradesh, Maharashtra and Uttar Pradesh**. Since DRRP formed the basis for the preparation of core network (CNW), no proposals in respect of these districts could be entered in the application, thus rendering the CNW incomplete to that extent. Data pertaining to the existing roads were left blank or contained invalid data in 6414 cases. Thus the DRRP database was incomplete rendering it ineffective for monitoring and making decisions.

4.11.4 Core Network (CNW)

The CNW database did not contain all the roads as per the DRRP database. Out of 2,32,948 records of DRRP database, only 77941 (33.46 per cent) records were

reflected in the CNW database. The fields for origin, destination, length of the road and the segment of the roads were blank in 7397 cases. The road segment length was not equal to the difference between the beginning and the end of the chainage in 1081 cases of the database. Though the road segment length was available in 1063 cases, the start and end chainages were missing. Further, in 69 cases, the road segment length was zero or less than zero. Thus, the data comprising CNW was incomplete or invalid and the application lacked validations which rendered the data unfit for decision making.

4.11.5 Comprehensive New Connectivity Priority List (CNCPL) and Comprehensive Upgradation Priority List (CUPL)

A test check of CNCPL displayed on the web site of OMMS revealed that:

- the CNCPL on the web site contained records with invalid data like 0, 8,3 and 10 in the field ‘population served’.
- Of the 25 roads featuring in the CNCPL of the block ‘Agali’ (District Anantapur, Andhra Pradesh), 4 roads were not part of the CNW according to the table containing the data on existing roads.
- Further, it was also observed that the Pavement Condition Index (PCI) was not filled in 33,750 cases without which upgradation and maintenance priorities of the concerned road works were not possible to be determined. The PCI is mandatory for the preparation of Comprehensive Upgradation Priority List (CUPL). As the PCI was not filled in 33,750 cases, it is evident that the CUPL displayed on the web site of OMMS was unreliable.

4.11.5 Preparation of Detailed Project Reports (DPRs)

Out of 43,363 records in the data on sanctioned projects, only 456 records were traceable in the database of CNW and only 940 roads were traceable in the DRRP database. Thus a high risk was attached to according project approvals based on OMMS data. Further, out of these 940 roads, 40 roads were not part of the CNW according to the DRRP database. These anomalies indicated the absence of referential integrity of the data in OMMS.

4.11.6 Forwarding of proposals after scrutiny of DPRs

The package ID in the sanctioned projects database was either blank or contained invalid data in 364 cases. Further, the fields for road name, start and end points of road, surface types, which were crucial for deciding the scope of work, and the date of sanction were either blank or contained invalid data. This indicated that the database of sanctioned projects was incomplete and not reliable for decision making.

4.11.7 Tendering and Award of Work

Audit examination revealed that 1481 cases of tendered works in the database were not traceable in the database of sanctioned projects. Similarly, there were 5157 sanctioned projects in the database that were not traceable in the database of tendered works. This indicated a lack of referential integrity between the databases of tenders and sanctioned projects. This could have been avoided if the required relationship was established during the development of the application.

4.11.8 Execution and Monitoring

Under PMGSY, payment was not to be made to a contractor unless quality assurance tests had been conducted as per the prescribed procedure and results were satisfactory. A review of the website information of OMMS revealed that inspections had not been carried out or the fact of such inspection having been carried out was not promptly entered in a large number of road works which had been completed. Also, out of the 28,237 road works, no information regarding inspection was available in the database but payment was shown to have been made in respect of 7810 completed road works. This indicated that validation controls were missing which could have prevented data entry relating to payments in respect of road works where inspections had not been carried out.

4.11.10 A test-check of the statements of physical and financial progress of phase I and III of PMGSY sent by NRRDA to the Ministry (as of May 2005) with reference to the web site data of OMMS revealed discrepancies as detailed in Table 14.

(Rs. in crore)

| Sl. No. | Item | Figure reported by NRRDA | Figure reflected in web site | Difference | Figure reported by NRRDA | Figure reflected in web site | Difference |
|---------|--------------------------------|--------------------------|------------------------------|------------|--------------------------|------------------------------|------------|
| | | Phase I | Phase I | Phase I | Phase III | Phase III | Phase III |
| 1 | Value of Proposals approved | 2464.68 | 3032.05 | (-) 567.37 | 5313.41 | 5946.65 | (-) 633.24 |
| 2 | Amount released | 2471.32 | 2365.10 | 106.22 | 3591.48 | 2308.73 | 1282.75 |
| 3 | Number of Road works | 13151 | 13021 | 130 | 8446 | 8823 | (-) 377 |
| 4 | Number of Road works completed | 12589 | 10021 | 2568 | 3731 | 2651 | 1080 |
| 5 | Expenditure upto May 2005 | 2272.10 | 2153.63 | 118.47 | 2780.32 | 2381.46 | 398.86 |

The discrepancies in the data above showed that the database was incomplete and unreliable, NRRDA not being in a position to rely on the OMMS database was compiling the physical and financial progress manually for reporting to the Ministry.

4.11.11 Accounting functions

Despite its significance, the online accounting module was developed and implemented only in 2004 after a gap of two years of the implementation of the first version of OMMS. A review of the database revealed that data relating only to Madhya Pradesh and Rajasthan were available in this module. Reasons for not exploiting the module fully were not ascertainable in audit.

4.11.12 Absence of IT Strategy

While the PMGSY started in December 2000, the hardware was provided to the States/DPIUs during 2002 and the website was launched in November 2002. As a result, though OMMS was envisaged as a core component for monitoring PMGSY, by the time it was formally launched in November 2002 an amount of Rs. 2452.25 crore had already been released for 13217 road works as of March 2001. The absence of an IT strategy thus became a handicap and prevented proper exploitation of OMMS.

4.11.13 Lack of detailed supporting policies

The proposal setting out the responsibilities of the participating agencies was deficient as it covered only broad areas to be shared by various agencies involved in the development of OMMS. No documents laying down stage wise targets for implementation of OMMS, procurement plan of hardware/software corresponding to the software development, detailed training plan of OMMS, and concurrent review on the technical aspects of networking were available. Neither the Ministry nor NRRDA formally defined an IT Security policy and the existing rules and regulations were not modified to suit the IT environment.

4.11.13.1 The Ministry provided hardware to the States/ District Programme Implementation Units (DPIU) in 2002 but no report on physical verification of hardware was requisitioned (October 2005). There were 15,654 users authorized for entering data in OMMS but in 15,634 cases the usernames were the same as the passwords and were in most of the cases the names of the respective states, districts, blocks and DPIUs. This exposed the system to possible unauthorized log-ins.

4.11.13.2 The software design document contained two tables for capturing the login details of users. The first table was used till 16 July 2003 and the second table was being used since 17 July 2003, audit examination of which revealed that

- the field for storing the transaction number, which is generated automatically, contained 1,89,662 missing numbers signifying deletion of records.
- in 1049 records, the field for automatically generating code of the State for which data entry was being done, was blank.

- in 1945 cases, the field for automatically generating the name of the module in which data entry was being done, was blank.
- in more than 9000 cases, the IP addresses were invalid⁶.
- there were 13 users who had repeatedly entered data pertaining to several States. Out of these 13 users, 10 belonged to either C-DAC⁷ or the Ministry or NIC⁸. However, out of the remaining three users, two used IDs belonged to state users. These users had entered data for more than one State. The user ID was registered for West Bengal but the user made entries for the States of West Bengal and Uttar Pradesh using the same IP address in some cases. Similarly, the user ID registered for Andhra Pradesh was used to make entries for Andhra Pradesh and Arunachal Pradesh. Moreover, in these cases, the IP addresses were invalid and the field for automatically generating the data last updated by the users was blank in all the 1,28,029 cases in the table for storing the log data. This made the maintenance of an audit trail impossible and exposed the system to risks of unauthorized manipulation.
- Though the browser restricted the login attempts, it did not maintain any log of failed attempts. Further, the application did not give information to the user of the last successful login date and time.

4.11.14 The User Requirement Specification (URS), a tool used in the initial stages of an IT project to document the user requirements was deficient and underwent several revisions upto March 2002. It contained a simple narration of the existing system without any detailed description. It did not specify the functional requirements namely features, capabilities and functions of the system, major system components and interactions, operational environment including manual procedures required, interfaces with other systems, requirements for support of the system such as maintenance organization and help desk. It also did not specify quality attributes such as availability, reliability and usability and other considerations such as security, audit, safety and failure modes in emergency situations. It contained annexures that were neither referenced in the document nor were used in software development as described. It also did not contain the information needs that would be met or specific reports that would be generated.

4.11.15 Software Requirement Specification (SRS) which is also a prerequisite for development of the software was not approved formally as no documentation regarding its formal approval by the Ministry or NIC was available on record and it was revised several times upto September 2002. While describing the attributes of various entities used in the application, SRS did not state validation/logic of a large number of attributes. For example, data entry of essential fields like names of States,

⁶ It contained either 5 octets or the 4th octet was more than 255. In computer technology and networking, an **octet** is a group of 8 bits. It can be expressed as a decimal integer in the range 0–255. The IP Addresses have four octets.

⁷ Center for Development of Advance Computing

⁸ National Informatics Center

districts, blocks, villages, habitations, connectivity, total population, names of MLA/MP, road name, category, chainage were not made mandatory. As a result, the software lacked validations exposing it to the risk of data entry errors. Out of a total of about 350 tables that were available in the database, 58 tables did not contain any data (October 2005) including a few master tables signifying the fact that referential integrity⁹ was not enforced in these cases. Table description and relationship details were not documented. No documentation was available regarding formal stage/module wise testing, testing reports, formal acceptance of each module of OMMS and post implementation review of the Application.

4.11.16 Inadequate monitoring of training

Centre for Development of Advanced Computing (C-DAC) was to impart proper orientation and training to the state level officials of the National Informatics Centre(NIC)/National Informatics Centre Services Incorporated (NICS) in the operation of the software at a centralized location besides arranging the training infrastructure including space and computing environment. NICS was to conduct the training programme for end users, once a year, at the state level on OMMS and was to provide the faculty and training infrastructure. The Ministry incurred an expenditure of Rs. 47 lakh on training to the end users in States/DPIUs (October 2005). However, no documentation was available regarding the formal training schedule of the modules and the number of end users trained. There was also no feedback from the end users furnished to the Ministry on the training imparted (October 2005). The Ministry released payments to NICS and C-DAC without ascertaining whether targets for imparting training were being met or not.

4.11.17 Improper change management

The software for OMMS was amended on several occasions namely, Intermediate Monitoring System (2002), Offline module (2003), Operations Manual (2004), Online Accounting Module (2004) and various other informal changes which were apparent from the help modules which had not been updated and still contained help on items which were not found on the connected forms. Though it was clarified initially that the modifications would be carried out only at the central level, no formal documentation regarding changes made to the Application was available. The user manual contained no information about the offline module which was developed for data entry for DPIUs with poor internet connectivity nor was any other documentation available regarding this module.

4.11.18 The Government while according approval to the PMGSY and the guidelines of this scheme envisaged OMMS as a core component for monitoring the progress of the scheme. Although the PMGSY commenced in December 2000, the OMMS was formally launched in November 2002. The accounting module of OMMS was developed only in 2004 and was under implementation in only two States. Audit scrutiny revealed weaknesses in the design and internal control mechanism of the OMMS. The database of OMMS was incomplete and unreliable. Thus even after five

⁹ Referential integrity in a relational database ensures consistency between coupled tables.

years of launching of PMGSY and incurring an expenditure of Rs. 20.67 crore, the OMMS, a core component for monitoring the scheme, was not found fit for decision making and monitoring.

4.11.19 The Ministry did not furnish specific replies to the deficiencies pointed out in OMMS. However, in its general reply furnished in December 2005, it accepted that they did not have a formal IT strategy and IT group and that they depended on NIC and C-DAC for co-ordinating the functioning of the Application. The Ministry also accepted that changes were made in the database and the SRS after implementing the Application. The Ministry's reply that the software was tested by C-DAC before hosting the website was not tenable as C-DAC was the developer of the software and the main responsibility of ensuring that the Application was developed as per the requirements was that of the Ministry. While accepting the fact that the States had not yet filled the data in important fields even after using the software for more than 3 years, the Ministry stated that the database was designed with proper indices and keys but the States were not prepared to make data entry and therefore nulls were allowed in many fields. The reply of the Ministry was not tenable in view of the fact that adequate preparation was lacking while introducing the OMMS and non-feeding of data in important fields had primarily contributed to the unreliability of the database rendering it unsuitable for informed decision-making.

Recommendation

- *The deficiencies in the software of the Online Monitoring and Management System (OMMS) may be removed on priority by evolving a practicable action plan which should include providing adequate training to the users in the States. The accounting module of OMMS may be urgently implemented so that it would be an additional tool for the Ministry and the States to strengthen the financial management of the programme.*

5 Conclusion

The PMGSY which aimed to provide connectivity to habitations with population of 1000 persons and above by 2003 and 500 persons and above by the end of 2007 failed to achieve the desired level of success owing to various shortcomings in planning, fund mobilization, ineffective monitoring and operational deficiencies. The estimates projected for coverage and fund requirement while launching the programme were unreliable and unrealistic. The requirement of funds was estimated in December 2000 at Rs. 58,200 crore for connecting 1.41 lakh habitations which went up to Rs. 1,32,150 crore for connecting 1.73 lakh habitations by March 2005. The Ministry could mobilise only Rs. 12,293 crore while the state governments could send their proposals for an amount of Rs. 17,394 crore between 2000-01 and 2004-05. The Ministry ignored the vital requirement of a correct assessment of the absorption capacity of the States and obtaining realistic data of the habitations to be connected and started the programme on the basis of insufficient and incorrect data. Consequently, the programme suffered from severe shortfall in funding compared to the estimated requirement. The Ministry did not put in place any useful tool for fixing and monitoring the achievement of the targets. Even the OMMS was introduced

belatedly and was beset with deficiencies and problems of software, inadequate training and incomplete coverage which could have been sorted out with an effective IT strategy. Execution of work was deficient as instances of inefficient contract management leading to substantial time over run, non-recovery of liquidated damages and so on were noticed. Roads constructed under the programme deviated from the standard design and specifications prescribed in the Rural Roads Manual despite the existence of the three tier quality control mechanism under the programme. Monitoring was ineffective despite an elaborate mechanism prescribed at all levels both at the Ministry and NRRDA due to inoperative and ineffective OMMS as the data fed into the system were not reliable. The programme, thus, did not have authenticated data on the magnitude of the workload, an ineffective monitoring mechanism and was still without a clear cut plan of mobilizing the required resources even after the lapse of five out of seven years of its projected life. The state governments compounded the problem with slackness in monitoring the quality of work, non-enforcement of the conditions of the tendering procedure and neglecting the maintenance of the constructed roads. That the guidelines continued to be revised till November 2004 only highlighted the fact that the Ministry went about the programme of utmost importance without adequate ground work and firm targets. The outcomes of the programme were not even susceptible of measurement, in the absence of relevant data.

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