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Abstract — The objective of this research paper is to work on the subject “Challenges & Opportunities in IT applications management & Infrastructure monitoring” which can prove financially & managerially helpful for organization BYPL. The objective of the project was to get the detailed knowledge of the issue involve in application of practices and methods of infrastructure in Distribution Sector and to check different options and their feasibility and adaptability in terms of Indian power sector. It includes study and analysis of projects such as Outage Management System (OMS), Modular Integration Distribution Automation System (MIDAS) & Geographical Information System (GIS) and other related Advanced Energy Systems.

Keywords — Outage Management System (OMS), Extra High Voltage Management System (EMS), Operations and Maintenance (ONM), Low Tension (LT), High Tension (HT), Management Information Systems (MIS).

I. INTRODUCTION

Outage Management System (OMS) project is to monitor and analyze the whole process of fault restoration of power, from the receipt of consumer’s complaint to the normalization of supply including tracking of resources, in the power distribution and power supply system [1, 2, 3, 4].

MIDAS project allows for remote monitoring of the health of 11KV network equipment’s quick location [5, 6, 7] of faults and even predicts faults prior to their occurrence [8, 9]. MIDAS is capable of sending auto alerts via sms. It is a cost effective, easy to use and implement solution to efficiently manage 11KV distribution grids with minimum service disruptions [10].

Currently the below listed seven modules are integrated in OMS [11, 12, 13, 14, 15]:
1. CMS (Complaint Management System)
2. DOMS (Distribution and Operation Management System)
3. EMS (EHV Management System)
4. SLMS (Streetlight Management System)
5. ORM (Operation Report Management)
6. MND (Maps and Drawings)
7. GIS (Geographical Information System)

Fig.1. Outage management system current architecture

II. CMS sub-sections

1. CMS – Complain Management System
   I. How to Enter in the CMS?

   CMS module runs through an integrated module OMS (outage management system) On the basis of User Name and Password User can enter into OMS [16, 17, 18]. Click on CMS which appear in the right pan of OMS main form [19, 20].

   CMS
   • Master
   • Operation
   • Status
   • Shift Report
   • Admin
   • Exit

   Fig.2. CMS – Complain Management System architecture
2. DOMS - Distribution and Operation Management System

I. How to Enter in the DOMS?

DOMS module runs through an integrated module OMS (outage management system) on the basis of User Name and Password User can enter into OMS [21, 22]. Click on DOMS which appear in the right pan of OMS main form [23, 24, 25].

II. In DOMS there are many menus which are listed below:

3. EMS- EHV Management System

I. How to Enter in the EMS?

EMS module runs through an integrated module OMS (outage management system), on the basis of User Name and Password User can enter into OMS [26, 27, 28], click on EMS which appears in the right pan of OMS main form.
4. Operation Report Management

I. How to Enter in the ORM?

ORM module runs through an integrated module OMS (outage management system) On the basis of User Name and Password User can enter into OMS. Click on ORM which appear in the right pan of OMS main form. If users don’t have your user id and password, users can request for the user id and the Password [35, 36, 37].

II. Main Form

Fig.8. Operation report management architecture

4.1. Master

Fig.9. Operation report management: Master - architecture

- Reliability Indices - Give the details of reliability indices
- Reliability Index - Give the details of reliability index
- Net Consumption - Give the monthly details of maximum shedding on demand
- Maximum Sheding - Give the month wise details of maximum shedding on demand
- Peak demand - gives the details of peak demand of energy monthwise
- Gross consumption - gives the details of gross consumption of energy monthwise
- Ho current complaint analysis - gives the details of time analysis of ho current complaint
- Breakdown analysis - gives the details of time analysis of breakdown complaint
- HVS analysis - gives the details of time analysis of HVS complaint

Fig.10. Operation report formation procedure [38, 39]

5. Operation and Maintenance Management

Fig.11. Operation and maintenance management report formation procedure

6. Street Light Management System

I. How to Enter in the SLMS?

SLMS module runs through an integrated module OMS (outage management system) On the basis of User Name and Password User can enter into OMS. Click on SLMS which appear in the right pan of OMS main form. If users don’t have your user id and password, users can request for the user id and the Password [40, 41].

Fig.12. GUI for street light complaint details

6.1. Procedure for Registering a Complaint

1. Press F1 to download the area list, click on particular then press F2 to enter that area in the form [42, 43].
2. Enter the cons ref no., which automatically fills up the consumer name, and all other details regarding that con ref no [44].
3. Enter the caller name, address, mobile no., phone no.
4. Enter the fault category and type of faults regarding to that fault category.
5. Click on save to lodge the fault and a unique no. is generated to that fault.

6.2. Procedure for Registering a Complaint
1. Double Click on the particular complaint.
2. Street light complaints details form displays.
3. Fill the acknowledgement bar, action taken report, restored taken given in the form as name, designation, employee no., and password as mandatory Fields [45].
4. Complaints details form should be filled step by step in following manner ie. ACKNOWLEDGEMENT, ACTION TAKEN REPORT, RESTORED TAKEN & REVIEW REPORT.
5. After filling the respective details the complaints goes into their categories.

7. GIS – Geographical Information Systems
A system for capturing, storing, checking, integrating, manipulating, analysing and displaying data which are spatially referenced to the Earth. This is normally considered to involve a spatially referenced computer database and appropriate applications software.

I. GIS is unique as
- It handles SPATIAL information – Information referenced by its location in space.
- It makes connections between activities based on spatial proximity.

II. Assessment Of Outage Management System (OMS)
1. Overall assessment of current system

Fig.13. Geographical information systems components

Fig.14. Overall assessment of current system
2. Challenges in current OMS

- GIS Integration needs to be done.
- Increasing the consumer interaction through web portal interface.
- To provide reliable and fast execution of the consumer services.
- To define & assign roles and responsibilities to each participant of the system.
- To have proper supervision and controlling of the system.
- To provide training for making the participants competent enough to handle and execute the system effectively.
- To design the system in such a way that it is simple for the end users to understand.
- To make integration of different components of OMS effective and well-coordinated.
- To make standard operating procedures for each participant in the system.
- To develop and integrate the ORM, MND & GIS Modules.
- To have coordinated efforts in the execution of the services with other companies [46, 47, 48].

3. Recommendations to make current OMS more effective & efficient

Fig.15. Possible proposed/desired outage management system

III. SUMMARY OF IMPACTS

Several anticipated impacts of the new system on the existing organizational and operational environments of the user are expected [49]. For Example:

- Elimination of the current deficiencies will make the user perform more productively.
- It will help improve company’s services and Consumer satisfaction [50].
- It will help improve the system’s reliability and availability.
- It will help decrease in the cost of maintenance of the current system. Etc [51].

1. User Organizational Impacts

The new system’s development will be assigned to 3 members of the current Software Development team at B.S.E.S. Yamuna Power Ltd New Delhi. One among them will be assigned the Leadership of the project. All the duties of governance, development, test, debug, publish, maintenance, up gradation etc. will be assigned to this team [52, 53, 54].

2. User Operational Impacts

The will be the following operational impacts to the organization during the use of the new OMS:

- The new OMS will be a web based system so the users will have to learn using the new system [55, 56].
- Updated ARCGIS database will be used in the new OMS as an additional Data-source [57].
- Updated Consumer database and company’s network details’ database has to be provided for the new OMS [58, 59].
- With the elimination of current deficiencies, there will be an increase in the operational productivity of the organization. For E.g. conversion into Web application will reduce the resource utilization of user’s computers, making them more fast and available. Besides that low configuration computers can also perform better than before [60].
- With correctly updated information (currently areas under Breakdowns, Shutdowns, Load-Shedding, and approx. time for rectification etc.) available to the users, the Consumers will be fed correct information, hence improving Consumer services and satisfaction [61].
- The Consumer can himself check the status of his complaint. This will further aid in Consumer services and satisfaction.
3. User Developmental Impacts

The users of the new OMS will have to put in the following efforts prior to the implementation of the new OMS:

1. Complete and clear understanding of current OMS, its functions and objectives.
2. A training will be conducted by the developing team regarding:
   a. Newly included features and their usage.
   b. Changed features and their usage.
   c. Excluded features and the reasons for exclusion [64].
3. For testing purposes the new OMS will be released in selected ONM offices, DIVISION offices and Complaint centers, where the user will have to use the new System concurrently with the current OMS.
4. Before the development of the new OMS the users are required to give in their Input for new features desired, useless old features suggestions etc [65, 66, 67].

4. Assumptions and constraints

There are several reasons that can prove out as constraints to the development and implementation processes of the new OMS. Some of them are listed below.

1. Improper mapping of different Data-Sources to be used.
2. Collection and integration currently unavailable data into the system. (For E.g.LTlevel data).

IV. CONCLUSIONS AND FUTURE RESEARCH

This specialized research paper is centered around the working of Current Outage Management framework and examined the distinctive modules involving it. This exploration paper inspected the components and difficulties of utilizing the Outage administration framework.

Moreover, the finished assessment about existing outage management system framework reveals that enhancements in on-demand outage management system frameworks have, to some degree, invalidated the moderateness consider sending these courses of action, as with a pay for every use esteeming model even little endeavours can pass on explanatory instruments and adventure these plans without concentrating on huge system theory. Throughout the years, control clients and architects have basically possessed the capacity to utilize complex inquiry-based logical devices, which have limited the utilization of the answer for master clients and kept easygoing business clients and other operational clients under control.

The research study also reveals to the key inhibitors and issues in Existing Outage Management System, which can be amended and comprehended while fabricating new Outage Management Systems. Furthermore research study shows that the new outage management system framework can be proposed which will overcome the gaps in the working process of current OMS and make it much more reliable, convenient and advanced system for the processes of fault restoration, tracking of resources and resolving consumer grievances in the power distribution sector.

Acknowledgement

The authors would like to first of all thank Mr. Harsh Sharma, Vice- President (IT, ETG& NMG) who gave us opportunity to work with the Organization. Special thanks to Mr. Sameer Bangar, Senior Manager (OMS & GIS) who gave us his valuable time and guidance to understand the concepts of the projects undertaken and practical exposure of the software systems to work on the real time data application. The authors would also like to acknowledge Mr. Swaroop Mukhoti, Senior Manager (MIDAS) for his valuable support & guidance throughout this project. The authors are highly grateful to Ms. Manali Kasma (Assistant Manager), Mr. Naveen Chauhan and Mr. Mayank who gave us their invaluable time and helped us to go in right direction and execute the project effectively. The authors would like to thank Mr. Anil Vaishy, Deputy General Manager (SCADA) for giving us exposure to his business processes, operations, latest practices adopted by them in order to give make the company highly efficient in delivering quality services to their consumers. Special thanks goes to officials of BSES Yamuna Power Ltd., who had shown faith in us to deputation of this Project and without their insights and helpful thoughts, we would not have gained as much knowledge as we have. Their help has sparked our interests even more! Thanks!
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International Journal of Emerging Technology and Advanced Engineering


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