

Electric Utility Asset Management- A Review

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Abstract

Electricity is an indispensable service that contributes to affluence and quality of life. To support the stipulation of high quality electricity supply at lowest possible cost, a well-designed, efficiently operated and maintained, reliable utility network is required. Asset management (AM) is a core function for electric utility enterprises which is strongly linked with both revenue and reliability of electricity supply. Factors that impact on performance are therefore of great interest to those who regulate utility and those who provide electric utility services.

This paper aims to present a comprehensive exposure to asset management classification, a variety of attractive continuance techniques developed, data organization in current years. Huge amounts of information are being unruffled, with the help of wide array of smart metering devices. The state of affairs of asset management get changed due to advent of data-mining techniques.

Keywords: asset management, electric utility, data management.

1. Introduction

In the three core sectors of power business, the use of accessible assets becomes competent and effectual because of augmentation of streamlining and artistic advancements worldwide [1]. For making imminent fiscal lead from employ and amputation of assets, oversee risks and lifespan expenses, asset management acts as a role model. Before, in cutthroat production business due to cartel, asset management has not as much of significance, but due to escalating employ and amputation of assets for imminent fiscal lead make it more imperative in power market. In Power Business, outfitted affairs of system and assets maintenance is oversee by short term and mid term AM while tactical forecast is oversee by long term AM. Allocation of asset management is as shown in figure 1, with two dominion based on time [3] and activity [4].

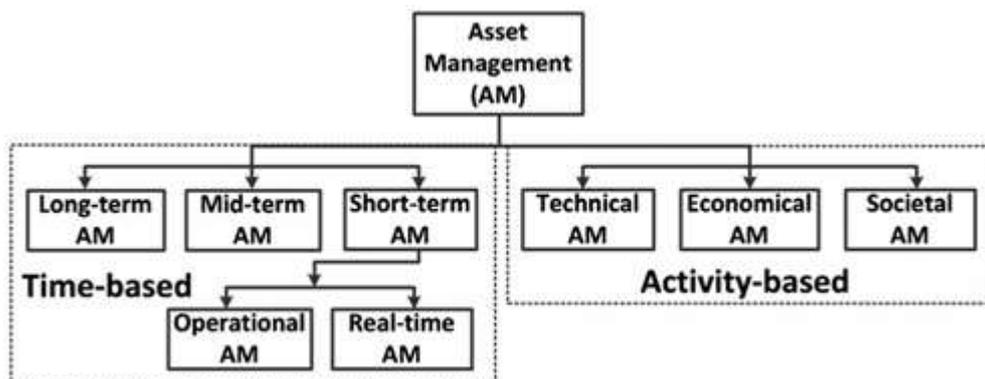


Figure 1. Allocation of Asset Management.

2. Time and Activity Domain Asset Management

2.1. Long Term Asset Management

Accessible transmission and distribution assets are enhanced in long term asset management, in the instance from a year and greater than year. It concentrates on bankroll for neoteric assets and competence addendum by imminent forecast. A precise forecast will slow down the risks involved in bankroll of neoteric assets and pecuniary losses.

2.2. Mid Term Asset Management

It includes optimal scheduling of equipment maintenance and distribution of accessible resources in the time frame ranges from a few months to a year. By precise preservation and finest allocation of conservative and inexhaustible power reserves for trading power, the senility of accessible amenities can be protracted. The very important factor is a maintenance cost which is one of the functions of asset outages. According to availability of resources throughout load distributions, maintenance cost can be considerably reduced, when intended outages are scheduled. So, a best maintenance plan extensively reduces the risk of unplanned outages.

In non preservation scheme, asset managers have to draft preservation forecast for all power plants rely upon dependability and fuel coercion.

- for premeditated and brownout of assets, risks should be cutback.
- for vying phase outfitted outlay should be underestimating.
- exploiting allied reserves by apportioning erratic reserves
- preservation itinerary for spanning the existence of assets
- attainment of crisp assets by broaden venture outlays

2.3. Short Term Asset Management

Operational asset management and real-time asset management are two subordinate of short term asset management. Communally corporeal and fiscal risks of assets are abridged in operational AM. Any amendment in asset state and recital which are astonishing brownout are appraised by real-time AM. Because of a technical amelioration it is easy to locate the coincident observation of reserves, which contributed drastically towards better management and decision-making process in short-range.

2.4. Technical Asset Management

Corporeal stipulation, preservation and itemization of assets are set up by technical asset management. Ageing of components is the foremost trepidation which is associated with corporeal situations of assets. Conserving the precedent forecast, fiasco anticipation are other zones of technical asset management.

2.5. Economical Asset Management

In manifest occasions where technical asset management failed to execute steadily, economical asset management is worn. It generally configured the pecuniary facet, preservation outlay and other outlay associated to procurement of extra parts, *etc.*

2.6. Societal Asset Management

The exploitation of asset is evaluated for the effect on the society and ambiance alsofor a broad anteriority architecture, breakdown incepted is not endurable. Further any trouble in

other places like schools, government offices will hamper the reliability and reputation of DISCOMS.

3. Domains of Asset Management

There are two imperative dominions of Asset management

1. **Physical domain:** The physical dominion consists of all the corporal apparatuses of power business.
2. **Non-physical domain:** Nonphysical dominion basically refuges the facets from methodological disputes resembling network scheduling to further cost-effective leitmotifs resembling scheduling of investment and budgeting.

A non-physical dominion encompasses fundamental points listed as:

- Preservation plans
- asset virtual reality
- analysis of apparatus ailment
- arithmetical error exploration and arithmetical asset management tactic for distribution
- transmission life taxation

Maintained strategy scrutinizes the enslavement among maintenance and rejuvenation activities, innumerable maintenance approaches such as preventive maintenance which is generally conceded out before fiasco befall and corrective maintenance which is generally conceded out after fiasco befall, can be configured. Multifarious maintenance tactics and their fundamental gatherings are shown in figure 2. Generally first predilection is given to corrective maintenance for pecuniary reasons also in zones where austere and sudden forfeits are not produced. Foremost socio-economic forfeit triggered by lethal fiascos is the hitch of corrective maintenance. Preventive maintenance is to build up a reliability-based asset management called RCM. According to literature survey, aeronautics business zone which take emphases on maintenance and restoration prerequisites in multifaceted and perilous assets, was first to execute RCM [7] which was further copied in electric power business. RCM as per issued literatures are extensively acknowledged in asset management [8,10-13].

Assets managers also follows two other maintenance plans viz. time-based maintenance (TBM) slated with uniform time interims where all apparatuses are patterned timely and condition-based maintenance (CBM) [9]. If time interims were not enhanced, because of unnecessary interruptions it leads to technical failures or economic losses caused. In the occasion that an emerging fault is detected, CBM activities are executed. Underneath usual maneuver the control factors are oversight by maintenance strategy, in CBM. The methodical intensive care is obligatory along with assets governor bounds delineation. Recital taxation on assets is subsidized by CRM for acknowledging concealed culpabilities which leads to athorough fiasco [14].

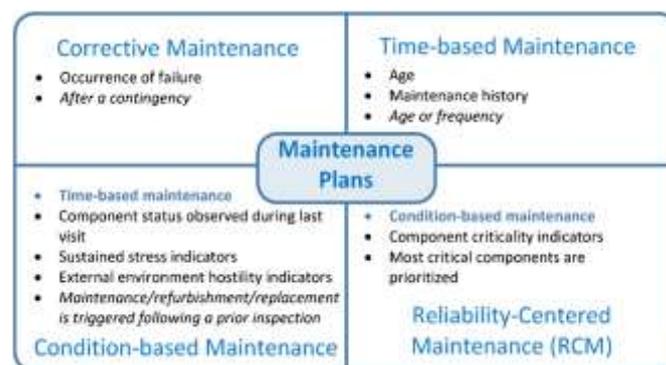


Figure 2. Maintenance Plans.

Power transmission is often said as backbones of energy markets. For transmitting spawned power to points of exploitation indispensable assets were desired by transmission scheme which lease them to tradeoff the power between generation and demand, for this diverse assets are mandatory[15].

4. Data Management

In the existing state, data management muddle both dominions of asset management. Lot of data will be congregated by using smart device and software’s which assist utility enterprisesto recital assets. Among the examination tariffs and mean periods of fiascos, asset management prerequisite massive statistics for recitalification [16]. Data management context castoff in asset management is shown in Figure 3. The factors of asset management are analyzed by the advanced digital tools.

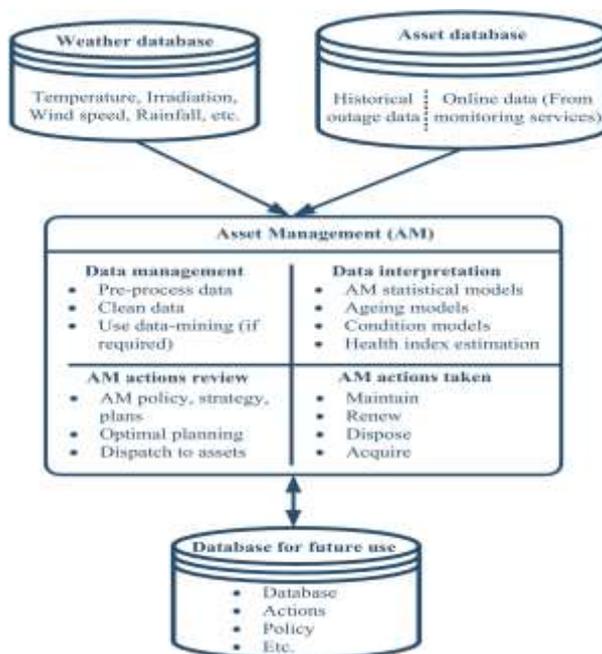


Figure 3. Data management context castoff in asset management

Risk-based asset management (RI-BAM), an advanced tool, unites Engineering and fiscal facets of asset management. On the root of several carefully worked-out procedures of assets, lifespan statistics is utilized for fiasco modeling which can further utilized for dependability and preservation optimization[18,19].

5. Risk Assessment in Asset Management

In power sectors, interruption of power supply is considered as the utmost risk. So to avoid the utmost risk, risk analysis becomes the fundamental element of asset management. Massive investment on equipments maintenance and their upgradation makes the risk analysis as vital parameter which has a straight impact on operational targets. Its effect are classified as follows:

1. Type I: it is because of the outages in the system caused due to maintenance events. It bank on geology of scheme, preservation history of apparatus, generation forecast, claiming outage forecast in short-term and the outage epoch miniaturize.

2. Type II: Asset worsens as there is delay in maintenance.
3. Type III: It causes due to not taking any corrective measures on continuing the operation in alarm and emergency state.

Figure 4 shows the impact of maintenance on asset reliability.

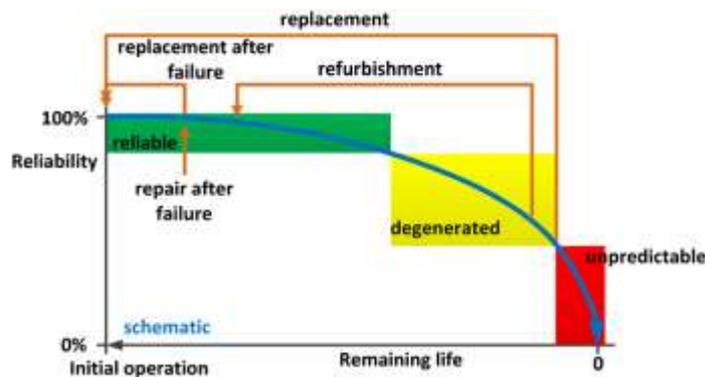


Figure 4. Ageing Model for Asset Recreation [2].

6. Conclusion

Asset management emphasizes on optimization of lifespan, maintenance and helps in concocting trade idea for investing on new assets. An enhanced information management systems can be premeditated in order to analyze the data and for developing new tools. These new tools so developed can be utilized for numerous aftermath such as intensive care, preservation administration, acquisition and inventory control, prophetic and supervisory modeling. A new risk management tools should also be designed in order to scrutinized and recital the fallouts.

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