

Plant Maintenance management Practices in industries

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Abstract: This paper endeavors to present a classification, review and analysis of the literature on Plant Maintenance Management Practices (PMMP) employed in Automobile Industries. There is a considerable amount of published research available concerning plant maintenance during the last few decades. . Similarly many research articles are available which focuses on various aspects of automobile industries. However, very few studies focus on critical examination of maintenance practices in Automobile Industries in particular. Hence considering the slump in automobile industries in the recent times, a wide-ranging and focused review is attempted here and only those researches have been examined which mainly concentrates on this core aspect. Thus one of the objectives of this literature review is to investigate the present state of Plant Maintenance Management Practices, based on studies conducted in different countries and published in a variety of journals over the past two decades. An examination of 55 pertinent research studies have shown that the publications can be grouped in two categories namely Conceptual and Empirical Research. An analysis of these research articles published between 1990 and 2008, revealed that current maintenance practices ranges from conventional to the latest techniques for optimizing maintenance function like TPM, RCM and Proactive

Maintenance. These studies focused more on maintenance problem solving and the main difficulties are reported along with probable solutions. Another goal of the paper is to analyze the articles by year and type of journal they were published in, to determine the trends in maintenance management studies and recommend future direction for research.

1. Introduction:

It is only since Second World War that there have been profound advances in engineering and scientific technology that have highlighted the need for more attention to be paid to maintenance of engineering systems. Till very recently, maintenance management was more of a traditional skill based management discipline which depended on experience, guts and luck. Today the question 'Is change in Maintenance Management necessary?' is increasingly being asked. Continual modernization and the pressing need for higher and higher productivity have resulted in the increased development and use of sophisticated & complex machines and equipments. This has resulted in increased capital employed in production equipment (Waeyenbergh & Pintelon, 2002). Systems are also becoming more costly relative to their operation & support. In case of capital equipment used in process and various other plants,

which are one-off and cannot be prototype tested, incipient failures occur. This affects production and resulted in loss of revenue. This is further compounded by the fact that in recent years rising inflation has brought with it substantial budgetary constraint in every organization. To control the budget in organizations, downsizing is mostly adopted which reduces the availability of personnel for unscheduled work. Furthermore next to the energy costs, maintenance costs can be the largest part of any operational budget (Hansen, 2006; Lofsten, 2000; Park & Han, 2001). Hence adequate and timely maintenance actions are required which will minimize the incidence of such failures, and increases the reliability of machines and equipments through the effective management of maintenance function. Thus it is evident from the preceding discussion that importance of the industrial maintenance is undeniable, and it is now a well established fact that the requirement of maintenance function and therefore the maintenance management has grown tremendously and still growing. Same is case with automobile industries. In recent past automobile industries are under enormous pressure for their survival and growth because of their unique characteristics. With increasing automation and mechanization in automobile industries, production processes are becoming highly sensitive to machines and peoples. Consequently, the role of equipment maintenance in automobile industries in controlling quality, quantity; reducing costs and to achieve the high levels of reliability-necessary to meet production targets are more evident and important than ever. To succeed in this new environment, the machines and equipments of an automobile

industry must be maintained in ideal operating conditions by effective maintenance.

2. Goals of the research :

after passing a selection process and are evaluated according to some criteria, as compared with articles from congresses, symposia and websites. Other articles such as exclusive reports in news magazines, newsletters, special columns and editorials are left out as the authors feel that they deal with general information in a limited manner. Similarly books written on maintenance are also omitted from the review. The publications were identified through a number of databases published between 1990 and 2008. It is important to stress from the outset that to identify, locate and acquire publications of interest, the following databases were consulted: Blackwell, Cambridge University Press, Emerald, High-Wire Press, IEEE (Institute of Electrical and Electronic Engineer), Oxford University Press, Pro-Quest, EBSCO and Science Direct Online. To consult the referred journals, the key word 'Maintenance' and 'Automobile' were used to search the articles from the database consulted. As a part of the research it was decided to classify and analyze the literature in detail. The course of action included the following steps:

- Updating the list to ensure that literature is as current as possible
- For literature search, both hard copy search in established libraries in India and electronic search in World Wide Web were made to ferret out the literature pertaining to industrial maintenance in auto industries. While the authors have tried their best to include as many publications as possible, they do not claim that their listing is complete or exhaustive in nature

Developing a classification scheme was the next step. First a bibliographical list of all publications was developed and a file was created in Excel spreadsheet

Keeping these observations in mind the authors decided to approach the review process in a different way, as illustrated in the next part of the paper.

5. Observation:

Maintenance management is the direction and organization of resources in order to control the availability and performance of industrial plant to some specified level (Gillett, 2001). Maintenance is a function in an organization that operates in parallel with production. Moreover besides being a support function, it has a role in gaining and maintaining competitive advantages. Therefore, it is very important for all relevant stakeholders to be aware of the role of maintenance in achieving sustainable and competitive business environment. An integrated model for maintenance function has been conceptualized and depicted The primary output of production is the desired product while demand for maintenance would be the secondary

output as a result of production activities. This output would act as input for the maintenance function. Maintenance results in restored production capacity which would further act as secondary input to production thus completing the maintenance cycle. Thus production manufactures the product while maintenance produces the capacity for production. The quality of the final product is affected by both the production process and the quality of maintenance work.

6. Technical Part :

The technical category of the maintenance task is comprised of maintenance services and its quality, the methods, resources, materials and control strategies. required for maintenance. Following were the observation when the literature was analyzed on this aspect.

7. Main maintenance management fields

The technical part:

The maintenance “products”. Specification of the different types of services and

“products” from the maintenance function.
Specification in relation to each plant system.

Quality of the maintenance “products”.
Specification of quality of the maintenance jobs. Quality reports, certification documents, decision about maintenance standards, etc

Maintenance working methods.

Specification of working methods, time

standards, relation between maintenance jobs, etc.

Maintenance resources. Equipment for maintenance, buying maintenance services, information about new equipment, capacity of equipment, usage control, etc.

Maintenance materials. Inventory planning (spare parts, etc.), warehousing, relation to vendors, etc.

The human part:

Internal relations in maintenance function. Relation to other departments, corporation and coordination especially to production.

External relation for the maintenance function. Relation to external parties, especially related to environment and safety. Contact to local authorities, press, labor organization, customer, vendors, neighbors, etc.

Organization of the maintenance function. Design of the organization, selection of the people, relation between groups of skills, responsibility, and authority.

Controlling maintenance activities. Scheduling of maintenance jobs, progress in work, manpower planning,

Economic Part:

Structure of maintenance. Work breakdown of maintenance, responsibility for work packages, area structure, relation to

accounting system, specification base (drawings, documentation), etc.

Maintenance economy. Economic control of maintenance: cost estimates, budgets, cash flow, accounting for the maintenance function. Plant investment and financing.

7. Finding and Future Direction :

A scrutiny of the publications shows that several aspects of maintenance along with many other interesting and diversified applications have been found in sufficient detail. The review exposed some research proposition points which could be: development of appropriate maintenance strategies, JIT in maintenance, maintenance management information system and its implementation, benchmarking in maintenance, application of AHP in maintenance, reliability in maintenance management, application of MCDM in maintenance, maintenance and human factor, maintenance and QFD and most importantly the implementation of TPM. These insights may serve a great deal towards maintenance function improvement in automobile industries. Thus academicians, practitioners and researchers have a good number of sources in the form of articles, to study, discuss and debate over many aspects of maintenance. In this paper we have argued that despite the burgeoning maintenance management literature, comparatively few studies have shown plant maintenance management practices, delineated metrics, or benchmarking practices in auto industries. Moreover, we propose there has been limited reflection on important

insights from the wider contemporary literature on PMMP.

8. Conclusion :

The paper reviews the research work on plant maintenance management practices in automobile industries under the traditional operation paradigm. The current work gives a broader view of maintenance practices and researches carried across the globe, but as maintenance is now a widely accepted philosophy for competitive advantage, more research work is required in auto industries. Finally, the research needs for future was presented. It is the authors' intention to utilize the knowledge gained from this literature review to develop a comprehensive and holistic design for maintenance methodology that will be presented in the next part of this research.

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