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Research Article

PERFORMANCE EVALUATION OF MAINTENANCE SYSTEMS IN PARS NEOPAN COMPANY

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ABSTRACT
Maintenance systems are the most important support, with the aim to optimize Capabilities Machinery in order to achieve maximum productivity, including 4 under preparation systems, Statistics and data, planning, maintenance and evaluation and control. This system for improving the effectiveness of Factory owners and customers need to meet Continuous Evaluation and corrective action is applied In this research. Maintenance systems is introduced and methods of performance evaluation systems and its critical role in the management. Maintenance systems and method of expression is composed of a balanced scorecard approach and efficiency and effectiveness measuring has been provided. Efficiency and effectiveness measuring method, analysis factor of efficiency and with balanced scorecard approach, Financial, customer, and resources indicators is determined. This method provided for a maintenance department.

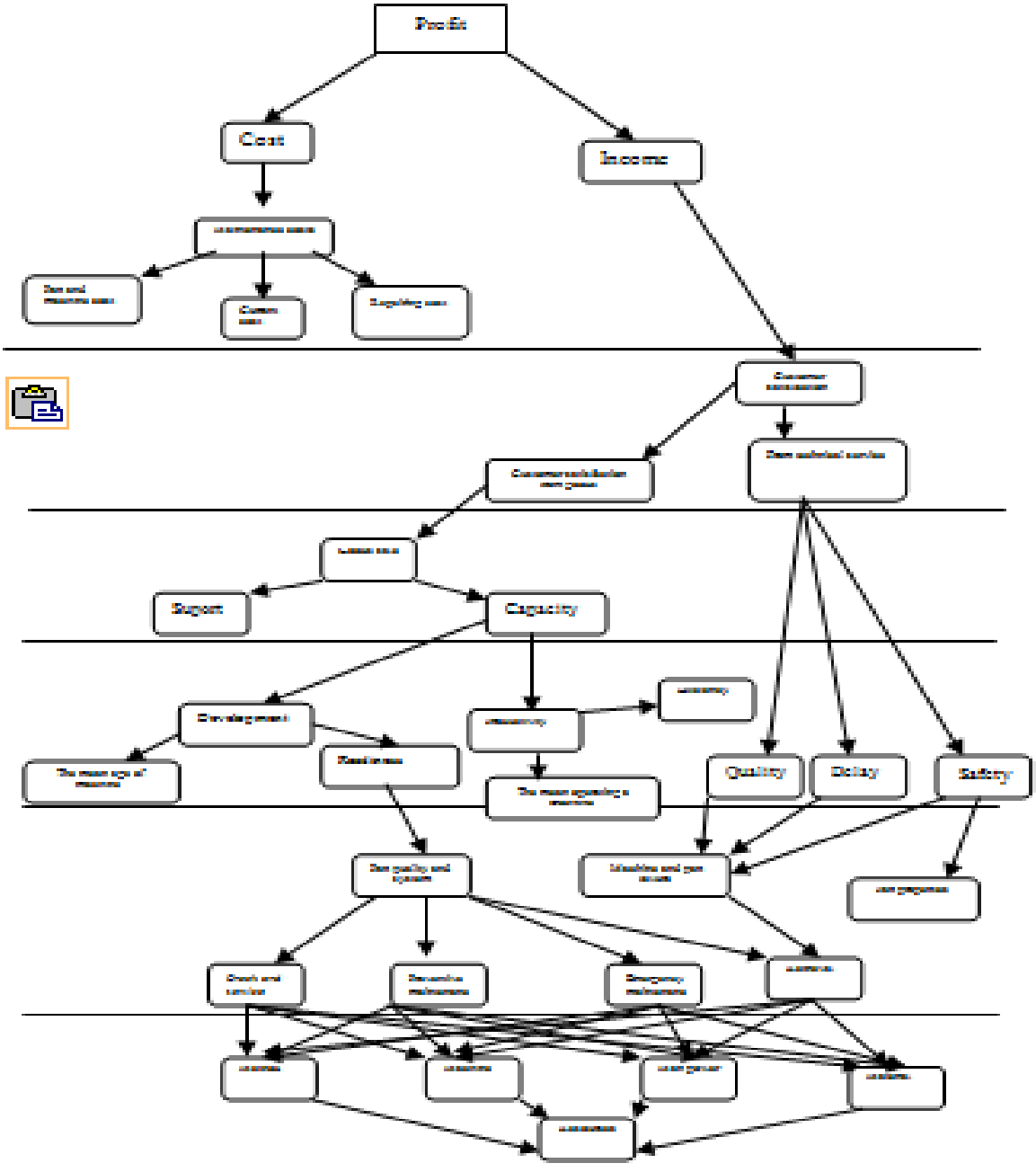
Key Words: *Maintenance Systems, Balanced Scorecard, Efficiency*

INTRODUCTION
Today many researchers have studied about maintenance system (Akhshabi and Akhshabi, 2011; Akhshabi, 2011). Reliability is an important parameter to assess industrial system performance. Its value depends on the system structure as well as on the component availability and reliability. These values decrease as the components' ages' increase, i.e. their working times are influenced by their interactions with each other, applied maintenance policy and their environments. Among the different types of maintenance policy, we suggest to study the maintenance system widely applied in large systems such as transport systems, production systems, etc. Every organized prevention process aims at an optimization of costs (understood as the expenditures) and the time required for the performance of prevention (of the object remaining in a maintenance system). This problem is systematically being developed in the literature (Barlow and Proschan, 1995; Be Dkowski and Da browski, 2006; Birolini 1999; Duer, 2004; Duer, 2008; Dhillon, 2006; ITO and Nakagawa, 2000; Nakagawa, 2005; Teramoto *et al.*, 1990; Ushakov, 1994; Duer, 2009**)**
).Traditional evaluation methods of the prevention performed. Through the performance of specific monitoring activities, the basic technical parameters of these devices are checked according to the indications of their control devices. These issues have been developed for a long time now, just as technical diagnostics and the reliability theory of technical devices have been developed (5, 6, 13, 8, 10, and 12). Therefore, diagnosing has become particularly important for this class of technical objects as the objects described in this article.

The Balanced Scorecard
Balanced Scorecard is a new management concept that helps to all managers at all levels to monitor and control their Key activities. Robert Kaplan and David Norton creator of this masterpiece, offered that managers collect information on the four perspectives on a card to analysis them. These include four perspectives: customer perspective, internal business processes perspective, the perspective of growth and innovation and the financial perspective. Other gates organizational answered the following four basic questions:

- How do customers view the organization?
- The main organization ability is in what areas?

Figure 1: Goals of Maintenance System with BSC



- Whether the organization has the ability to improve and create value?
- How to look to shareholders?
- Robert Kaplan and David Norton in count the BSC key benefits for organizations such as

- Establish a comprehensive control from the key criteria
- Integration between the organization's plans
- Division Strategy into measurable factors in business

Performance Evaluation of Maintenance Systems System Based on the Balanced Scorecard

For performance evaluation of maintenance systems using BSA, we define four main target group and for each parameters, we suggest:

1. Shareholders' expectations capture maintenance system
2. Meet maintenance system customer demands and needs
3. Management of maintenance system
4. Access to resources and methods needed

The Financial Aspect

Managers Survival depending of expectations shareholders is resolved. Score card approach that emphasized that the life cycle of an organization (development, consolidation, withdrawal) would be completely different financial indicators and target values regardless of this meet to will be away of long-term goals of your organization. Its aims are to reduce the costs and increase revenues and profits. However one of the main criteria of maintenance system is cost that is due its process. Another criterion is income that achieve from maintenance system.

Customer Aspect

An appropriate evaluation must meet to evaluate customer's criteria. Customer are operators, or cargo owners, therefore indirectly also customer of maintenance system too. Maintenance system would be satisfied by reducing component failure and machine failure. With improved machine parts properties, safety and satisfaction and reduce delays they also bring satisfied. Customer Reviews collected by interviews, reports, feedbacks and surveys, will be evaluated with quantitative and qualitative indicators.

Internal Processes Aspect

Customer demands and expectations of stakeholders have non-negligible and important, so system administrators should organize processes and guarantee that the results of it vouched shareholder expectations and customer demands. The most important criterion of performance evaluation is the effectiveness that in order to increase its fleet must be increase, operation and Quality. Improve readiness and quality is duty of the maintenance system. Maintenance systems for maintaining quality of machines components and systems to reconstructed and modernized, preventive maintenance, inspection and service and decreasing of quality, pay to repairs emergency. Selection of these methods depends on objectives, strategies and standards of organizations and facilities and resources. These indices evaluated by determining the time, cost and reliability are that the goals, standards, and is compared with predetermined values.

Learning and Growth Aspect

The criteria related to customer and process specifies parameters that important for successful companies in global competition. Intense global competition requires companies to permanent improve of products, processes, and to Introducing completely new products, together with the ability to have developed capabilities. In the learning aspect identify some structures that organization must be providing long-term growth and learning of them. Major maintenance activities by providing activities and resource management and work systems are supported. Therefore, organizations must assess the resources and capabilities to evaluate them. Resources include manpower, machinery and Tools, materials and components, financial resources and systems, include methods and systems management, and technical information. Selection what resources and processes used in the maintenance system determined the success in achieving the objectives of the shareholders and customers.

Key Performance Indicators

For grow and improve any organization evaluating its performance and planning should be based on it needed. And to measure and evaluate the performance of the organization and its sub-units are defined performance indicators. This tool is used for quantitative goals. Goals of maintenance system collected as:

- Increase Productivity
- Improve Maintenance
- Development
- Customer Satisfaction

Increase Productivity Indices:
This goal is the most important of goal's organization. The status of the organization to increase productivity is managed. Therefore, has used two indices for evaluating the capacity of the organization and management to increase the utilization of the organization productivity. Indices of organization includes capacity, efficiency and the mean operating a machine and Indices of management includes machine readiness, machine performance and machine reliability of failure in operation
Capacity: The purpose of the evaluation criteria as the number of production in time unite Planning for the future Planning.
Efficiency: This index will determine the effectiveness of the organization and is the proportion of the activities that are completed with efficiency. For example, if efficiency of the organization is 50% its means that 50% of machine work without the destruction.
Maintenance Indices:
Reliability of Failure: The goal of this index is determine life of replacement parts and repair after repair and renewal. So make sure not to damage in the warranty period will be measured by this index. And its method of calculating is the number of machines without failure due to failure in the warranty period to the number of machines in working.
Mean Time Between Failures (MTBF): The goal of this index is assessment of damages by the operation and maintenance of their machines or systems when Time is down. And its method of calculating is the average performance between preventive and emergency maintenance to the next preventive maintenance.
Ratio of Maintenance Time to Waiting Time: From start to finish repairing of a machine is spend that is not including repairing, materials and parts procurement, commissioning and start working machinery, and the administration. This index seeks to eliminate or reduce the time. And its method of calculating is mean time to repair the machine to waiting time for repairs.
Ratio of Maintenance Time to Standard Time: Repairs efficiency are reduced to the causes of deficiencies and lack of human resources and planning materials and components .And compared with evaluated standard of repairs time carried out under optimum conditions is calculated.
Ratio of Technique Delay to Working Time: Technical delayed are adverse effects in working time. The index is calculated to assess the damage and the delay caused by technical failures machine to machine work time is calculated.
Development Indicators:
To improve maintenance system performance, increased quality and reduced maintenance costs, will do with the arrival of new machines stead old machines besides increase in productivity.
Mean Age of Machine: This index represents the estimated total life of machine and it is calculated by sum of the product of the relative number of any machine and its life.
Added Machine: This indicator tells the story of the development of machines
Ratio of Added Machine: This indicator shows the relative development as so it is used in planning
The Customer Satisfaction Index:
Wishes of their organization without reaching customer satisfaction are more vain delusions, hallucinatory. Therefore, our customers, partners present and future and their response will result to shareholder approval .So when we will successful that understand our customers every time.
Ratio of Satisfied Customer of Technique Service: The customer satisfaction survey results can be test from relative of the Technical Services with The words good, bad, medium. The index is calculated by the

number of customers who have chosen good and average score to the number of customers who have responded to the survey.

Ratio of Received Technique : This index shows dissatisfaction customer from technical service and quality. It is calculated by the ratio number of technical complaints received from customers.

RESULTS

Maintenance system in order to reach the desired goals and improve efficiency of specific piece of equipment and machinery and reduce Lesions is essential. This improvement is necessary that all factors of production system, including production output, Quality, cost, just in time, safety and morale of employees, should be evaluated quantitatively and qualitatively to the extent possible.

One of the methods of evaluating the productivity of the organization used efficiency and effectiveness indicators that increasing the effectiveness of not only waste quality but also waste preparation and utilization can be reduced.

With BSC in the organization can be achieve comprehensive control of organization from key criteria. And can be integrate among the organization's established plans and can be divide strategies into measurable factors in the business.

In addition, the card Balanced scorecard is used as a tool for design evaluation of the performance index as a tool to evaluate objectives achieving.

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