

Integrated maintenance and supply chain policy for transport mean take into account environmental constraint

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Key study :

Reliability, maintenance, supply chain, optimization, degradation

Abstract :

Recently, the integration of the management of logistic and maintenance becomes compulsory in order to face the operational problem in logistic and to ensure an economical global benefice. In this way, the present study investigates an integrated maintenance supply chain policy in order to improve the fleet reliability and enhance its performance taking into account some environmental constraints related to the supply chain. The objective is to establish simultaneously an optimal preventive maintenance strategy for men of transports and its supply chain. The optimization consists at minimizing the total cost integrated maintenance costs and costs related to the supply chain.

To deal with this problem, we apply a preventive maintenance strategy with a minimal repair. In this strategy, we consider two environmental impact factors which are that the crossed distance and the change of the climatic conditions. The key of our study consists at taking into account the hard influence of these two environmental constraints on the system degradation, more precisely on the failure rate of transport mean which impact the optimal preventive maintenance plan to adopt. In plus, we note that these two environmental constraints are impacted by the supply chain. In our study we will treat the real relation between the system degradation and the supply chain of the transport mean. Consequently, the routing distance will be optimized and in the same time will contribute to in the establishment of the failure rate depending to time and environmental condition.

Point of view literature, we notice that many studies are interested in the problem of the transport routing and treat only the economic aspect by minimizing the transport costs and delays, (Eckhart and Rantalab, 2012; Iannone,2012) without taking in account the maintenance costs of the vehicle. In the same time many interet studies are interested to the optimization of maintenance strategies of manufacturing system in order to minimize total costs or maximize availability (Hajej and al., 2012). (Dellagi, 2006). They take into account

several operational constraints but treating a transport mean and interesting the impact of the supply chain adopted on its degradation is not treated yet. According to the previous works, the minimization of the transport dispenses are treated in two steps. The first step is the optimization of vehicle routing: distances and cost minimization. The second step is the improvement of maintenance policies. So, the maintenance of the means of transportation is developed separately from the problem of the vehicle routing.

However the integrated maintenance shows that it is an effective method to decrease maintenance costs in aeronautic or reducing energy dispenses in the context urban transportation. In this study, we propose to connect the notion of the maintenance and the routing planning together for a simultaneous optimization and using environmental factors like the crossed distance and the climatic constraint.

A mathematical model was developed in order to determine an optimal vehicle routing distance as well as a minimum maintenance costs. In order to illustrate this model, a numerical example will be presented.