Optimization of the logistics function 
by controlling risks using influence diagram: 
cases of risks related to road transport

Abdelaziz Lakehal¹, Fouad Tachi²

¹ Department of Mechanical Engineering
Mohamed Chérif Messaadia University
P.O. Box 1553, Souk-Ahras, 41000, Algeria
e-mail: lakehal21@yahoo.fr

² Algerian Petroleum Institute
School of Skikda
Algeria
e-mail: a.lakehal@univ-soukahras.dz

The growth in the number of logistics platforms served by road, rail, waterway, and sea is a logical conse-
quence of the extensive and rapid development of merchandise trade in a globalized economy. Transport 
and logistics are part of the same activity chain that allows goods to be transported to their destination. Dependent on the requirements of their customers and suppliers and subject to strong competition, 
companies in this sector must manage challenges concerning deadlines, flexibility, and diversity of goods, 
while handling other risks associated with transport and logistics. The Bayesian approach, proposed in 
this paper, covers all the steps necessary to implement decision support solutions for risk management 
and control, starting from the identification of risks and the preparation of intervention to the conducting 
of various operations in crisis In this work, the prediction and the control of the road risks are conducted 
using the influence diagram method, whose final objective is the optimization of the logistics function. 
After identifying and analyzing the different risks, the Bayesian networks (BNs) are initially used to model 
these risks and to prevent the various challenging situations from taking place in the logistics chain. As 
a second step, we use the influence diagram as a tool for the decision-making procedure. Finally, a case 
study is presented to highlight the substantial contribution of this tool to controlling road risks while 
transporting goods.

Keywords: logistics, transport, control of road risks, Bayesian networks, influence diagram, decision 
making.

1. INTRODUCTION

Today, all industrial or distribution companies have comparable and related strategies, characterized 
by phenomena that have impact on their logistical choices and, consequently, on transport. The 
outsourcing of logistics operations [10], the concentration of logistics sites [7], the reduction in the 
number of selected logistics partners, the traceability of physical flows and documents (which is 
a growing requirement particularly for following up remote flows), controlling the smooth running 
of chains and being able to provide answers to customers’ questions [8], are all common elements 
that show the importance of logistics in optimizing transport. Therefore, as logistics performance is 
a function of several variables, the most traditional ones being: cost, quality, reliability, deadlines, 
and information, it should be noted that there are also risks related to the logistics chain, risks 
that can modify, or even prevent, in whole or in part, the efficient and effective flow of information, 
material, and products between the supplier of the supplier of the company and the customer of 
the customer of the company [11].