ABSTRACT
The management of certain systems, such as manufacturing facilities, supply chains, or communication networks implies assessing the consequences of decisions, aimed for the most efficient operation. This kind of systems usually shows complex behaviors where subsystems present parallel evolutions and synchronizations. Furthermore, the existence of global objectives for the operation of the systems and the changes that experience the systems or their environment during their evolution imply a more or less strong dependence between decisions made at different time points of the life cycle. This paper addresses a complex problem that is scarcely present in the scientific literature: the sequences of decisions aimed for achieving several objectives simultaneously and with strong influence from one decision to the rest of them. In this case, the formal statement of the decision problem should take into account the whole decision sequence, making impractical the solving paradigm of “divide and conquer”. Only an integrated methodology may afford a realistic solution of such a type of decision problem. In this paper, an approach based on the formalism of the Petri nets is described, several considerations related to this problem are presented, a solving methodology based on the previous work of the authors, as well as a case-study to illustrate the main concepts.

Keywords: Petri nets, sequence of decisions, metaheuristic, discrete event system, alternatives aggregation Petri nets, optimization
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