

## SIMPLIFIED APPROACH FOR OPTIMIZATION BY DYNAMIC PROGRAMMING

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### ABSTRACT

Optimization is the magic key for most engineering projects. It concerns to minimize costs / losses or to maximize returns. In both cases, all existed constraints are to be satisfied. There are many optimization techniques that are widely employed in order to achieve the optimum solutions. In this paper, the dynamic programming, as a powerful optimization technique, is employed for this purpose. The dynamic programming is used by two different methods. The first method is the ordinary technique that called recursive dynamic programming. While the second method is a combination between the dynamic programming and the linear programming, and is called a simplified approach.

Two different models are established. The first model represents a production scheduling for a factory producing pipes. While the second model represents pollution in a river. The optimum solutions are obtained by the PC for the two models applying the two mentioned techniques for each model. These optimum solutions are compared showing high degree of tendency.

It is concluded that the simplified approach is an effective tool to get the optimum solutions for the two models. It is easy, simple, accurate, fast and is solved by a common PC software. It is recommended to provide more study for the simplified approach. Also, it is recommended to investigate its application to problems with maximization objective functions.

### INTRODUCTION

It is always required to find the best, or at least near the best, decision among a range of possible decisions or policies. Optimization is usually regarded as a systematic process of finding the best decisions, without having to consider all possible alternatives. Optimization can be considered as an ensemble of steps that must be taken to find the optimum of a function. This function is usually called an objective function and represents a performance index. Common typical objective functions in general are the total costs, to be minimized, or the total benefits, to be maximized. However, optimization is only possible if there is a range of choices available. The success of optimization depends on defining effectively and realistically the problem and developing a reasonable model for the problem system.

Many real world systems can be modeled by linear programming, where there is a linear objective function subject to a set of linear constraints. The objective function is a measure of

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# Optimization A Simplified Approach

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