MANAGERIAL DECISION MODELING AND SIMULATION USING SPREADSHEET PROGRAMS

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Abstract. The paper presents some theoretical and practical issues related to decision-making in the field of economy. Using simulation and modeling techniques to assess the possible decision alternatives by What-If analysis. The paper analyzes the variation of results starting from a single input variable (Goal Seek) and provides a sensitivity analysis (Data Table), by comparing the alternatives in order to make optimal decisions using Scenario Manager features. Restrictions are imposed on some of the input values or on the results (Solver).

Key words: spreadsheet programs; decision-making process; Goal Seek; Data Table; Scenario Manager; Solver; Pivot Table.

INTRODUCTION

Spreadsheet programs have some useful options in the decision-making process. Most of these programs offer a range of facilities to answer questions like “What if?”. For example, ”What if you reduce costs by 10%”, “What products / projects within my business I have to sustain next?”. To answer such questions, the values containing the original data of the problem can be changed. When these parameters change the results change also (Data Table, Scenario Manager). On the other hand we can solve the problem in reverse, that means to find the value / input values that leads to a particular outcome (Goal Seek / Solver). In addition to these facilities there are tools that allow data from a spreadsheet to be permuted in order to highlight new information. (Pivot Table, Pivot Chart).

MATERIALS AND METHODS

In our example we have information about the bills received by a particular firm from its customers. We want to present the facilities mentioned above, linked to decision optimization in Excel.
For the beginning, let’s take the following example: client Ionescu has obtained a credit of 20000 lei, at an interest rate of 10%, for a period of 10 months. We can present the Excel facilities referred to decision analysis by answering the questions, as follow:

What is the monthly rate of payment?

What is the value of the credit that client Ionescu can obtain if he can pay 280 lei monthly?
It is tested how the result (the amount of the monthly payment) affects a minimal change in the input variables, for the given example (the amount of credit and the interest rate).

Fig. 4 A sensitivity analysis Data-What-If Analysis-Data Table
The Pivot Table is the tool that allows the flexible association of some fields in an interactive way, this fact leading to the re-grouping of data and presenting them in a synthetic manner.
Fig. 7 Pivot Table

Fig. 8 Pivot Table and Pivot Chart
CONCLUSIONS

The analysis of the variance on the results of a decision problem based on one or two inputs can be performed using tools like Goal Seek or Data Table.

Some issues may require multiple input variables or may be imposed restrictions on some of the input variables or on the outcome.

The analysis of a result by modifying the values from one or more input cells and by imposing restrictions on some input variables, or on the result from an Excel worksheet can be done using Solver tool.

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