

MATHEMATICAL MODELS REGARDING THE SELECTION AND CONTROL OF MEDICAL TECHNOLOGY INVESTMENTS

BATCA Viorel¹, DUMITRU Graziella Corina², CURPAN Alina Mihaela³, BITCA Tiberiu⁴,
CUC Lavinia Denisa⁵

¹The University Titu Maiorescu Bucharest, Romania, ²The Academy of Economic Studies Bucharest, Romania, ³The Academy of Economic Studies Bucharest, Romania, ⁴National School of Political Studies and Public Administration Bucharest, Romania, ⁵The University Aurel Vlaicu, Romania,

¹batcaviorel@yahoo.com, ²corinnadumitru@yahoo.com, ³curpan_alina@yahoo.com,
⁴tiberiubatca@gmail.com, ⁵laviniacuc@yahoo.com

Keywords: maintenance costs, leading replacement coefficient, normal life expectancy.

The mathematic pattern proposed [1] for the evaluation process is developed in two stages:

(a) **The first stage**, also called the **objective stage** is based only on **technical data (quantitative evaluation)** and it calculates a **priority coefficient of replacement PCR₁**.

(b) If PCR₁ exceeds a certain level, we pass to **second stage**, also called the **subjective stage (qualitative evaluation)**, based on information supplied by interviews and questionnaires from medical personnel. Within the stage, **the second priority coefficient of replacement PCR₂ is calculated**.

I. The objective stage is based on the following characteristics: **Age (x₁); The costs of maintenance (x₂); Downtime (x₃); The function of the machine (x₄); The quality of the logistic prop (x₅).**

The shares for the characteristics taken into consideration are: 25% of the maximum score is due to the logistic prop; 30% to the machine's functions and 45% to its state. The resulted pattern is:

$$PCR_1 = 9(x_1 + x_2 + x_3) + 7,5x_4 + 25x_5 \quad (1)$$

II. If 40 < PCR₁ < 60, then we will pass to **subjective stage** who takes into consideration the characteristics: **The behaviour of the machine during functioning (K₁); Frequency of usage (K₂); The comparison with newer patterns concerning the performances regarding the precision of the diagnosis, the therapeutic efficacy, etc. (K₃); The comparison with new pattern concerning the facility of usage (K₄); The comparison with newer patterns concerning the yield (K₅).**

The shares for the considered characteristics are: 20% of the maximum score is due to the machine's performances, 20% to the frequency of usage, and the rest, of 60% supports the influence of the comparison with new patterns existent on the market.

$$PCR_2 = 5(4K_1 + K_2) + 10(K_3 + K_4 + 2K_5) \quad (2)$$

The interpretation of PCR₂ coefficient: If PCR₂ ≥ 80, then it is urgently recommended to replace the machine; If 40 ≤ PCR₂ < 80, then the machine has problems and it is recommended a new evaluation until the end of the year; If PCR₂ < 40, then no actions of correction are taken.

REFERENCES:

1. Haşdău Corneliu, *Inginerie clinică*, volumul I, Editura Tehnica – Info, Chişinău, Iaşi, 2004.
2. www.romedic.ro/firme/aparatura-medicala
3. www.informatiamedicala.ro/dictionar-medical
4. www.scumc.ro
5. www.buymed.ro