

## Fuzzy present worth approximation of cash flow in replacement analysis

P.R. CHAVAN AND V.H. BAJAJ

Accepted : March, 2010

### ABSTRACT

In practice, replacement analysis involves uncertainty about cash flows. Fuzzy sets provide a mathematical framework for explicitly incorporating impression or uncertainty in to human thoughts or human subjectivity. This paper illustrates the use of fuzzy sets and possibility theory in replacement decision via fuzzy variable and numbers. Present worth approximation (PWA) and cash flow are specified as triangular fuzzy numbers (TFN's). A brief history of replacement analysis, basic concept of fuzzy theory is given and finally numerical example is present to replace the given machines using different dominance rules.

**Key words :** Replacement analysis, Cash flow, Presents worth approximation (PWA), Fuzzy sets, Triangular fuzzy numbers.

Replacement analysis is a useful tool in decision making problem. This technique is used to determine an optimal replacement sequence. In most of the real world system, there are elements of uncertainty in process.

A firm or industry invests high amount of rupees for different machines and equipments. The invested amounts are barrowed from various banks. Day by day the interested accrued on the loan goes to high. The important task of financial experts is to estimating present worth of cash flow. It is important to decide which machine is replaced firstly than other. In replacement analysis use present worth of fuzzy cash flow for finding optimal replacement sequence of given machines.

Replacement analysis involves the uncertainty in cash flow. Cash flow is the future sum of invested rupees at the end of year. In cash flow the interest rates are vague in nature, Chui (1994).

In real word, interest rates are varying from bank to bank. Fuzzy set theory is a generalization of classical set theory. Since it provides us with mathematical tool for describing of vague or imprecise concept in financial investment decision, such as "approximately 1000". For example 1000 would have membership of degree 1.0, Augustine (1998) (fig.1).

If sufficient data is available probability theory is commonly used in cash flow. When the sufficient data is

not available and probability information is not justified then decision maker use cash flow modeling, Savag (1954). This theory is sufficiently applied to numerous areas, such as decision making, engineering and in investment analysis

$$\mu_{\tilde{A}}(x)$$

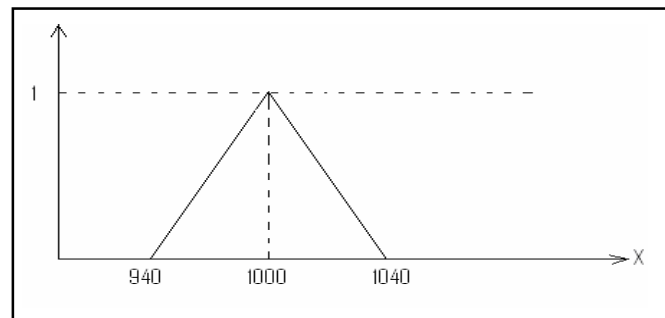


Fig. 1 : Triangular fuzzy number "approximately 100"

### Replacement analysis:

One of the most practical and topical area of engineering economics is replacement analysis. Mathematical models and analysis methods and analysis methods are used to determine the sequence of machine or asset for replacement purpose.

Replacement analysis is of great interest in uncertainty of cash flow. Cash flows are vague in nature. In this paper the cash flows are modeled as triangular fuzzy numbers (TFN's). Use Kaufmann and Gupta (1988) formula for fuzzy present worth of cash flow. The fuzzy numbers are based on the decision makers with his subjective judgments. Solution of this analysis is determined by various fuzzy ranking methods, Chui (1994),

### Correspondence to:

P.R. CHAVAN Department of Statistics, Dr. Babasaheb Ambedkar Marathwada University, AURANGABAD (M.S.) INDIA

### Authors' affiliations:

V.H. BAJAJ, Department of Statistics, Dr. Babasaheb Ambedkar Marathwada University, AURANGABAD (M.S.) INDIA