

Design of the CMHP Model for Selecting Future Technology Alternatives

Joon Young Park

Technology Planning Team, Samsung Engineering & Construction Co.,LTD

Cheol Shin Kwon

Dept. of Industrial Engineering, Sung Kyun Kwan University

Abstract

The major weakness of AHP-Analytic Hierarchy Process- is the evaluating problem of complicated multiple hierarchy and the weighting problem is done by many evaluators. MHP-Modified Hierarchy Process- model is a modified and an improved method which complements these problems and embodies the dicho-hierarchy structure and the weighting structure in AHP.

On the one hand, CIA-Cross Impact Analysis- method is one of the technological forecasting methods which produces the conditional probability of R&D completion taking account of Cross Impact between technology items.

However, we encounter the following problems when we try to apply the MHP and CIA method to the selection and evaluation of technology alternatives :

(1) It is difficult to precisely decide the priority of technology alternatives using the MHP model when there is cross impact between the technology alternatives which will be completed in the future.

(2) It is impossible to decide the priority of technology alternatives using CIA method if we assign the weights of evaluators in dicho-hierarchy structure.

To resolve these problems, we developed CMHP-Cross Impact Type Modified Hierarchy Process- model which is an improved AHP that considers cross impact by combining the logical structure of MHP and CIA.

To test the validity of the CMHP model, we performed a case study by collecting field data from one company which is a prototype of korean construction industry.

In order to prove that CMHP model outperforms the other methods, we compared the priority of technology alternatives that are obtained by using AHP, MHP, and CMHP through the empirical analysis based on field data.

Major findings of the research are summarized as follows.

(1) ① We designed the MHP model which reflects the weights of the evaluators' capability upon the dicho-hierarchy structure.

② We combined the CIA, which is a technological forecasting methodology that considers cross impact between future technology alternatives, into MHP.

③ We could develop a first CMHP model in R&D theory which determines the final priority by considering 「dependency」 and 「forecastability」 of technology alternatives.

(2) The valid test for feasibility of the CMHP model proved that CMHP has higher precision over AHP and the MHP model which respect to the logical description power and methodological structure.

(3) We could prove the usefulness of the adequacy of the dicho-hierarchy structure and the weighting structure of evaluators through the empirical analysis on field data.