

: *What is the Analytical Hierarchy Process (AHP)?*

Better known as "AHP", pronouncing each letter ("A" -- "H" -- "P"), this decision structuring tool is well-known in operations research circles. Approximately 25 years ago, Tom Saaty developed an approach for prioritizing and ranking alternatives (cf., Saaty, 1977). My first exposure to Saaty's ideas occurred in 1981 when I read his practitioner-oriented book titled "The Analytical Hierarchy Process". The AHP has been used extensively since it was proposed.

Ed Wasil (American University) and Bruce Golden (University of Maryland) recently served as guest editors of a special issue of *Computer & Operations Research* "Celebrating 25 years of AHP-based decision making". They conclude "AHP has had a significant impact on the practice of decision making." The issue has five articles including case examples of analyzing foreign direct investment opportunities, facilitating decision making about prostate cancer screening and evaluating neonatal ventilators for a women's health hospital. The release of the PC-based software program Expert Choice in 1983 made Saaty's theory and his prescribed prioritization process more accessible and potentially more useful for decision support.

So what is AHP? AHP is a multicriteria decision technique that can combine qualitative and quantitative factors for prioritizing, ranking and evaluating alternatives. The first step in AHP is to develop a hierarchical representation of a problem. At the top of the hierarchy is the overall objective and the decision alternatives are at the bottom. Between the top and bottom levels are the relevant attributes of the decision problem for comparing alternatives. The number of levels in the hierarchy depends on the complexity of the problem and the decision maker's model of the problem hierarchy. Once the hierarchical representation is identified, one generates relational data for comparing the alternatives. Then one determines the relative priority of each attribute using the comparisons. Finally, one calculates the priorities or weights of the lowest level alternatives relative to the top-most objective. The AHP uses paired comparisons to develop the prioritization. This simple, intuitive approach of comparing alternatives limits the cognitive demand on the decision maker and provides a means for checking the consistency of the comparisons.

A number of software packages implement AHP. The best known and most widely used is still Expert Choice. Ernest Forman (George Washington University) programmed the initial version of Expert Choice and he's still involved with enhancing and marketing the software. Expert Choice is well known for its user friendliness, it was the first graphical, mouse-driven implementation of AHP. The company also has a group support version of its software that uses input from keypads to support multiple raters.

So is AHP a DSS? No, AHP is a theory of how prioritization or ranking decisions should be made. The software Expert Choice has become more sophisticated in the implementation of its user interface over the years, but the underlying theory remains the same. Expert Choice can be used for special decision support studies and it can be used for creating a decision support system. The analytical hierarchy created in Expert Choice can be used to support ranking tasks like rank ordering the importance of military targets, the quality of research proposals or the quality of investment proposals.

At DSSResources.COM, you can find a case study using Expert Choice by John Wasyluk and Dan Saaty titled "Developing a Portfolio Approach to Capital Investment: A Case Study in Re-Engineering Resource Allocation at the U.S. Department of Veteran's Affairs". The case describes the use of Team Expert Choice to support the capital investment process at the U.S. Department of Veteran's Affairs. "The decision model was delivered to the project evaluation team

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on a laptop with radio frequency keypads to enable the team to efficiently rate each project against the objectives to which it contributed. The software allowed decision makers to use both quantitative and qualitative information to rate competing investments".

Congratulations to Tom Saaty and good wishes to all of the people at Expert Choice, Inc. I strongly recommend that readers visit www.expertchoice.com.

References

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