ISOMORPHISM BETWEEN AHP AND DOUBLE ENTRY BOOK KEEPING SYSTEM

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ABSTRACT

An isomorphic mapping, or a one-to-one correspondence, between the Analytic Hierarchy Process and the Double Entry Book Keeping system is pointed out and the isomorphism in its detail is discussed. First, two former related studies on the suggested isomorphism, one by Professor Ludwig Mochty of Universitat Essen and the other by Professor Yuji Ijiri of Carnegie Mellon University are surveyed. The Logarithmic Analytic Hierarchy Process, which is the logarithmic least squares theory framework applied to estimating priority weights from pairwise comparison data of the Analytic Hierarchy Process, is chosen for our proposed isomorphism. The isomorphism between the AHP and the DEBK (Double Entry Book Keeping) system is summarized from four viewpoints: system topology (graph/network), what variable to choose as potential, what is skew symmetric, and the relationship between the potential and the skew symmetric matrix. It is shown that the reciprocity of pairwise comparison measurement directly contributes to the double-entry property of bookkeeping system. Through an example of the Double Entry Book Keeping system with a set of transactions during a period, the presented isomorphism is examined in detail.

Keywords: isomorphism, double entry, book keeping, logarithmic least squares, skew symmetric