ABSTRACT

The importance of selecting the best technology through technology choice decision making is examined in a multi-objective context. Iron making technology choice for Indian environment is taken as a case study. The study is divided into two parts. In Part-I of the study, a three stage integrated framework is developed for technology choice decision making. Synthesizing the concepts of Analytic Hierarchy Process (AHP) and various fuzzy multi-criteria decision making methods, an hybrid model is developed to evaluate alternative technologies. The methodology is named as Fuzzy Hierarchical Decision Making (FHDM) method. The FHDM method is expected to facilitate a better technology choice decision making, and allows to incorporate all types of uncertainties, associated with alternatives data, into decision making.

Part-II deals with the studies of evaluation of iron making technology alternatives for Indian environment. The study successfully couples the information available from the literature and the records, with the results of the surveys that were conducted namely, importance weights of iron making choice criteria, and that of appropriateness weights of the alternative iron making technologies based on subjective criteria. Thirty one evaluation criteria are considered for evaluation of nine alternatives namely, Conventional Blast Furnace (CBF), Corex, DIOS, Hismelt, Romelt, Iron carbide, DRI-Gas, DRI-Coal, and Mini Blast Furnace (MBF), and to prioritize them using the FHDM method. Using the same data, priorities of alternatives are also evaluated using the AHP method, and a comparison is drawn between the two methods. The influence of change in importance weights of criteria, technology choice perspective, and future uncertainty on preferences of alternatives are also examined.

More importance is given to the methodologies such as synthesizing the elements of technology choice making, building the FHDM method, exploring the advantages of the FHDM over the other methods to apply in technology choice decision, suggesting a group aggregation method to pool experts opinions in the FHDM method, and evaluating the

priorities of alternative iron making technologies for various sizes of iron and steel plants in the Indian environment.

The conclusions are mainly related to the methodologies that can be used for alternative technology evaluation and the priorities of alternatives for various sizes of iron making plants in Indian environment.

Key Words: Technology Choice, Technology Evaluation, Appropriate Technology, Technology Management, Multi-Criteria Decision Making, Fuzzy Multi-Criteria Decision Making, Fuzzy Hierarchical Decision Making, Analytic Hierarchy Process, Group Decision Making, Indian Iron and Steel Industry, Iron Making Technology.