Nomenclature

\( T(V_i) \) - Total fuzzy scores representing membership functions for the \( m \) alternative Vendors \( V_i, \ i = 1, 2, \ldots, m \)

\( F_j V_i, \ i = 1, 2, \ldots, m \) and \( j = 1, 2, \ldots, n \) - Fuzzy Scores for each vendor system with w.r.t. each criterion

\( D_{\lambda} (V_i), \ \forall \ i = 1, 2, \ldots, m \) - Crisp scores with fixed \( \alpha \) and fixed value of optimism \( \lambda \), \( \lambda \in [0, 1] \)

\( N_{\lambda} (V_i) \) - Index of comparison for selection of vendors, \( V_i, \ \forall \ i = 1, 2, \ldots, m \) for fixed \( \alpha \) and \( \lambda \) respectively

\( D \) - Expected demand during a period (unit / period)

\( H_i \) - Holding cost per unit at the \( i \) th Echelon

\( C_i \) - Procurement / Ordering cost per cycle at the \( i \) th Echelon

\( O_i \) - Stock out cost per unit at the \( i \) th Echelon

\( L_i \) - Demand during lead time at the \( i \) th Echelon

\( Q_i \) - Order quantity per order cycle in units at the \( i \) th Echelon

\( \sigma_i \) - Standard deviation of demand during lead time in units at the \( i \) th Echelon

\( K_i \) - Safety/Service factor at the \( i \) th Echelon

\( \lambda \) - Maximum average inventory which is permissible along the supply chain

\( P_G (\mu), P \) - Performance grade set in \( G \)

\( \tilde{r}_{ij} \) - Preference entry of pair wise comparison of element \( i \) over \( j \), in the form of a triangular fuzzy number: \( ( r_{ij} \ r_{ij} \ r_{ij} ) \)

\( \tilde{R} \) - Judgment matrices with fuzzy entries of pair wise comparison by evaluators

\( \tilde{A}, \tilde{B} \) - Subsets of \( U \)

\( A \) - Row weight vector

\( A_{N \times M} \) - Weight matrix of \( N \) elements by \( M \) evaluators

\( f_{\tilde{A}} (\mu) \) - Degree of membership of element \( \mu \) in \( \tilde{A} \)
G - Finite universe of discourse of fuzzy Performance grade = (A, B, C, D, E, F)

\( p_x(\mu) \) - Degree of membership of value of \( \mu \) in G

\( P \) - Performance grade matrix of each Performance measures by all Evaluators

\( P_{exN} \) - Performance grade matrix of N performance Measures

\( T (l, m, u) \) - Triple that denotes a triangular fuzzy number where \( l, m, u \) stand For the lower, moderate and upper values respectively of the support of the triangular fuzzy number

\( U \) - Universe of discourse

\( W^T \) - Weight vector of the M evaluator's opinions = (\( w_1, w_2, \ldots, w_M \))

\( \alpha_{ij} \) - Discrete integers in [0, 2] that express the degree of fuzziness of the evaluators

\( \tilde{\alpha}_i \) - Normalized importance weight of each element = (\( \alpha_l, \alpha_m, \alpha_u \))

\( \delta_{ij} \) - Discrete integers in [-6, 6] that quantify the qualitative preference of element i over j

\( \lambda \) - Any real number in [0, 1]

\( \mu \) - Element in U