Interval-Valued Neutrosophic Hypersoft Sets (IVNHSs) for enterprise resource planning selection

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Abstract

An information system known as an enterprise resource planning (ERP) system is designed to organize and combine all of an organization's subsystems, such as marketing, manufacturing, finances, and purchasing transactions. The adoption of such a complete framework may result in significant cost reductions as well as time reductions for individual workers. This problem is solved by the interval-valued neutrosophic hypersoft set. A new area of research known as the hypersoft set is being established to resolve issues with the inadequacy and limitations of pre-existing models that are similar to soft sets in terms of the consideration and entitlement of multi-argument approximation functions. (This particular kind of function transfers the multi-sub parametric tuples to the power set of the universe. It concentrates on the splitting of each attribute into its own attribute-valued set, which is something that is lacking in current structures that are similar to soft sets.

Keywords: Neutrosophic Sets; Hypersoft Set; ERP; Interval Valued Neutrosophic Sets; Resource planning; Soft Set

1. Introduction

Because of the intense rivalry in the market, businesses have been pushed to investigate different kinds of business settings to lessen their overall costs, increase their returns on investments, cut their lead times, and become more flexible to the needs of their customers. The use of an ERP system is one option for improving the effectiveness of operational procedures in a company. When businesses are faced with some intricate and interconnected business issues, like attaining the corporation's economic objectives, trying to manage and simplify the company's procedures, better forecasting features, or obtaining the advantages of enhanced administration systems by lowering data redundancy, organizations will consider purchasing it[1]–[3]. An ERP system would often incorporate a centralized database that is used throughout the whole organization in addition to a variety of application modules. It not only saves information but also retrieves it when it is needed in a real-time situation, standardizing operations in the process. The application of an ERP system may be both time-consuming and expensive. The installation of complex ERP software systems costs businesses billions of dollars and requires countless hours of effort. However, the advantages that come with a well-executed ERP implementation make the effort worthwhile[4], [5].

The available ERP software solutions are unable to provide a once-and-done business model that is applicable across all processes and sectors. To put it another way, a lone ERP software package can't satisfy all of a company's features as well as all of its particular business needs[6], [7]. Therefore, businesses need to choose an ERP system that is both adaptable and sensitive to the needs of their customers[8]–[10]. The improper selection of the ERP system is cited as the primary factor contributing to failed ERP implementations. Not only can an improper selection process have a substantial impact on the implementation, but it may also harm the success of the firm. As a result,

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the significance of making a good choice when picking an appropriate ERP system cannot be stressed enough[11]–[13].

In situations that take place in the actual world, in which the data that is provided is sometimes inaccurate or hazy, classical logic, often known as Boolean logic, is rarely applicable. It has been suggested by Zadeh that a certain category of sets named fuzzy sets (FS), which was assumed its name by Zadeh, should be used when dealing with circumstances of this kind. In these sets, each individual in the universe is given a membership grade that corresponds to a closed interval that is measured in units. However, to deal with situations that have a higher level of complexity and ambiguity, it was discovered that the notion of FS is insufficient. As a result, these ideas were enlarged with a few expansions to meet the challenge. One of these significant advances was made by Atanassov and is known as intuitionistic FS[14], [15]. Because they take into account nonmembership grades, IFS is more successful than other methods in dealing with the ambiguity of data. In addition, IFS is capable of imitating the information that is accessible in a manner that is more accurate and logical. Insofar as the evaluation of the degree of uncertainty was concerned, both FS and the IFS were unsuitable for this sort of grade. As a result, Smarandache came up with the idea of neutrosophic sets (NS) to make up for this deficiency. NS are better equipped to sustain imprecision in the information's elements, and they may assist approximation reasoning activity that is carried out conscientiously. NS has a relatively higher computational burden than FS and IFS, even though their explanatory capability is superior to that of conventional FS and IFS. This is because NS includes nonmembership and indeterminant evaluated functional areas in addition to the standard IFS and FS[16], [17].

Systems like FS, IFS, and NS each portrayed a distinct restriction concerning the validation for a certain modeling tool. Molodtsov classified soft sets, also known as SS, as a novel mathematical formula that is parameterized to overcome this shortage[18], [19]. While constructing a single-argument approximation function, each variable in a collection of limitations in SS maps to the power collection of the universe of discourse. (eg researchers investigated the fundamental characteristics, elementary set-theoretic procedures, relationships, and functionalities of SS by using quantitative examples to illustrate their findings. FSS, IFSS, and NSS were conceived to combine the qualities of SS with those of FS, IFS, and NS, respectively. Even though a great number of academics have made significant contributions to the growth and extension of these hybridized architectures with the IV setting, the efforts made by academics are more notable in terms of their relevance to these models. (They did not only talk about the principles of IVFSS-like models, but they also used specific strategies for their applications in a variety of settings[20], [21].

The organization of characteristics into sub-attributive numbers in the shape of sets is a need for certain situations that might be encountered in the actual world. (e existing notion of SS is not satisfactory and conflicts with such situations, so Smarandache created the notion of hypersoft sets (HSS) to discourse the inadequacies of SS and to cope with the scenarios involving a multi-argument estimation purpose[22], [23]. SS are not sufficient and are incongruent with such situations. The fundamental concepts and assumptions of HSS have been broken down into their parts and shown with the mathematical formulation. The hybridization characteristics of HSS were examined by Rahman and colleagues under the settings of compound set, convexity and contour, modeling, and bijection respectively. (to find solutions to real-world issues, they used algorithmic decision-making processes. The concepts of neutrosophic hypersoft translations and complicated multi-fuzzy HSS were established by Saeed and his colleagues. These theories have implications for judgment and clinical diagnostics[24].

2. Preliminaries

Definition 1

Let neutrosophic sets (NS) be a ξ in $\wp$ can be described as $\left(\xi = \left(T_{\xi}(\mathcal{H}), I_{\xi}(\mathcal{H}), F_{\xi}(\mathcal{H})\right), \mathcal{H} \in E, T_{\xi}(\mathcal{H}), I_{\xi}(\mathcal{H}), F_{\xi}(\mathcal{H}) \in]-0,1+[\right), where\ T_{\xi}(\mathcal{H}), I_{\xi}(\mathcal{H}), F_{\xi}(\mathcal{H}) are\ truth, indterminacy, and\ falsity\ function, and\ -0 \leq T_{\xi}(\mathcal{H}) + I_{\xi}(\mathcal{H}) + F_{\xi}(\mathcal{H}) \leq 3+$

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Definition 2

Let ξ_1 *and* ξ_2 *be* two NS

$$\xi_1 = \left\{\left(T_{\xi_1}(\mathcal{H}), I_{\xi_1}(\mathcal{H}), F_{\xi_1}(\mathcal{H})\right), T_{\xi_1}(\mathcal{H}), I_{\xi_1}(\mathcal{H}), F_{\xi_1}(\mathcal{H}) \in]-0,1+[\right\}$$

$$\xi_2 = \left\{\left(T_{\xi_2}(\mathcal{H}), I_{\xi_2}(\mathcal{H}), F_{\xi_2}(\mathcal{H})\right), T_{\xi_2}(\mathcal{H}), I_{\xi_2}(\mathcal{H}), F_{\xi_2}(\mathcal{H}) \in]-0,1+[\right\}$$

Definition 3

Suppose G is the general set and A is the group of features based on G. Suppose $W(G)$ is the muscle set of G and B $\subseteq \mathcal{E}$. The soft set is defined as $(S,$ B)

S: B $\to W(G)$

and

$(S,$ B) = $\{S(o) \in W(G): o \in \mathcal{E}, S(o) = \emptyset \ if \ o \notin$ B}

Definition 4

$\boldsymbol{G}$	Universal set
$\boldsymbol{W(G)}$	Power set
$\boldsymbol{t}$ $\boldsymbol{t_1, t_2, t_3, \dots \dots \dots t_n}$	Collection of criteria
N	Number of attributes
$\boldsymbol{t_i}$ $\boldsymbol{t_{11}, t_{12}, t_{13}, \dots \dots \dots t_n}$	Sub criteria

The hypersoft can be defined as (S, $T_1 \times T_2 \times T_3 \times \dots \times T_n$ = B̈)

S: $T_1 \times T_2 \times T_3 \times \dots \times T_n$ = B̈ $\to W(G)$.

and

(S, B̈) = $\{\check{b}, S_{\ddot{B}}(\check{b}): \check{b} \in \ddot{B}, \ S_{\ddot{B}}(\check{b}) \in W(G)\}$

Example 1

Suppose a collection of criteria $b_1, b_2, b_3, b_4, b_5, b_6$ and sub of criteria $b_{11}, b_{12}, b_{13}, b_{14}$, $b_{21}, b_{22}, b_{23}, b_{24}$, $b_{31}, b_{32}, b_{33}, b_{34}$, $b_{41}, b_{42}, b_{43}, b_{44}$, $b_{51}, b_{52}, b_{53}, b_{54}$, and $b_{61}, b_{62}, b_{63}, b_{64}$.

B̈ $= b_1 \times b_2 \times b_3 \times b_4 \times b_5 \times b_6 = \{b_{11}, b_{12}, b_{13}, b_{14}\} \times \{b_{21}, b_{22}, b_{23}, b_{24},\} \times \{b_{31}, b_{32}, b_{33}, b_{34}\} \times \{b_{31}, b_{32}, b_{33}, b_{34}\} \times \{b_{41}, b_{42}, b_{43}, b_{44}\} \times \{b_{51}, b_{52}, b_{53}, b_{54}\} \times \{b_{61}, b_{62}, b_{63}, b_{64}\}$

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$(b_{\zeta11}, b_{\zeta21}, b_{\zeta31}, b_{\zeta41}, b_{\zeta51}, b_{\zeta61}), (b_{12}, b_{\zeta22}, b_{\zeta31}, b_{\zeta41}, b_{\zeta51}, b_{\zeta61}), (b_{\zeta11}, b_{\zeta21}, b_{\zeta32}, b_{\zeta41}, b_{\zeta52}, b_{\zeta61}), (b_{\zeta11}, b_{\zeta21}, b_{\zeta32}, b_{\zeta41}, b_{\zeta51}, b$

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$(b_{\zeta11}, b_{\zeta21}, b_{\zeta31}, b_{\zeta41}, b_{\zeta51}, b_{\zeta62}), (b_{\zeta11}, b_{\zeta22}, b_{\zeta31}, b_{\zeta41}, b_{\zeta51}, b_{\zeta61}), (b_{\zeta11}, b_{\zeta21}, b_{\zeta32}, b_{\zeta41}, b_{\zeta51}, b_{\zeta61}), (b_{\zeta11}, b_{\zeta21}, b_{\zeta32}, b_{\zeta41}, b_{\zeta51}, b$

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,

$\ddot{B} = \{\breve{b}_1, \breve{b}_2, \breve{b}_3, \breve{b}_4, \breve{b}_5, \breve{b}_6, \breve{b}_7, \breve{b}_8, \breve{b}_9, \breve{b}_{10}, \breve{b}_{11}, \breve{b}_{12}, \breve{b}_{13}, \breve{b}_{14}, \breve{b}_{15}, \breve{b}_{16}, \breve{b}_{17}, \breve{b}_{18}, \breve{b}_{19}, \breve{b}_{20}, \breve{b}_{21}, \breve{b}_{22}, \breve{b}_{23}, \breve{b}_{24}\}$

The neutrosophic hypersoft set (NHSS) can be defined as

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$(S,\ddot{B}) =$

$$\left(\breve{b}_1,(\delta_1,(0.7,0.3,0.7)),(\delta_2,(0.7,0.2,0.4)),(\delta_3,(0.8,0.3,0.7)),(\delta_4,(0.9,0.3,0.9))\right),$$
$$\left(\breve{b}_2,(\delta_1,(0.6,0.2,0.7)),(\delta_2,(0.7,0.2,0.6)),(\delta_3,(0.8,0.3,0.7)),(\delta_4,(0.9,0.3,0.9))\right),$$
$$\left(b_3,(\delta_1,(0.6,0.2,0.7)),(\delta_2,(0.4,0.3,0.4)),(\delta_3,(0.8,0.3,0.7)),(\delta_4,(0.9,0.3,0.9))\right),$$
$$\left(\breve{b}_4,(\delta_1,(0.7,0.3,0.7)),(\delta_2,(0.7,0.2,0.4)),(\delta_3,(0.8,0.3,0.7)),(\delta_4,(0.9,0.3,0.9))\right),$$
$$\left(\breve{b}_5,(\delta_1,(0.6,0.2,0.7)),(\delta_2,(0.7,0.2,0.6)),(\delta_3,(0.8,0.3,0.7)),(\delta_4,(0.9,0.3,0.9))\right),$$
$$\left(b_6,(\delta_1,(0.6,0.2,0.7)),(\delta_2,(0.4,0.3,0.4)),(\delta_3,(0.8,0.3,0.7)),(\delta_4,(0.9,0.3,0.9))\right)$$
$$\left(\breve{b}_7,(\delta_1,(0.7,0.3,0.7)),(\delta_2,(0.7,0.2,0.4)),(\delta_3,(0.8,0.3,0.7)),(\delta_4,(0.9,0.3,0.9))\right),$$
$$\left(\breve{b}_8,(\delta_1,(0.6,0.2,0.7)),(\delta_2,(0.7,0.2,0.6)),(\delta_3,(0.8,0.3,0.7)),(\delta_4,(0.9,0.3,0.9))\right),$$
$$\left(b_9,(\delta_1,(0.6,0.2,0.7)),(\delta_2,(0.4,0.3,0.4)),(\delta_3,(0.8,0.3,0.7)),(\delta_4,(0.9,0.3,0.9))\right)$$
$$\left(\breve{b}_{10},(\delta_1,(0.7,0.3,0.7)),(\delta_2,(0.7,0.2,0.4)),(\delta_3,(0.8,0.3,0.7)),(\delta_4,(0.9,0.3,0.9))\right),$$
$$\left(\breve{b}_{11},(\delta_1,(0.6,0.2,0.7)),(\delta_2,(0.7,0.2,0.6)),(\delta_3,(0.8,0.3,0.7)),(\delta_4,(0.9,0.3,0.9))\right),$$
$$\left(b_{12},(\delta_1,(0.6,0.2,0.7)),(\delta_2,(0.4,0.3,0.4)),(\delta_3,(0.8,0.3,0.7)),(\delta_4,(0.9,0.3,0.9))\right)$$

$$\left(\breve{b}_{23},(\delta_1,(0.7,0.3,0.7)),(\delta_2,(0.7,0.2,0.5)),(\delta_3,(0.7,0.3,0.7)),(\delta_4,(0.7,0.3,0.7))\right),$$
$$\left(\breve{b}_{15},(\delta_1,(0.9,0.3,0.7)),(\delta_2,(0.7,0.3,0.9)),(\delta_3,(0.7,0.3,0.7)),(\delta_4,(0.7,0.3,0.7))\right),$$
$$\left(b_{19},(\delta_1,(0.9,0.3,0.7)),(\delta_2,(0.5,0.3,0.5))(\delta_3,(0.7,0.3,0.7)),(\delta_4,(0.7,0.3,0.7))\right),$$
$$\left(\breve{b}_{24},(\delta_1,(0.7,0.3,0.7)),(\delta_2,(0.7,0.2,0.5))(\delta_3,(0.7,0.3,0.7)),(\delta_4,(0.7,0.3,0.7))\right),$$
$$\left(\breve{b}_{16},(\delta_1,(0.9,0.3,0.7)),(\delta_2,(0.7,0.3,0.9))(\delta_3,(0.7,0.3,0.7)),(\delta_4,(0.7,0.3,0.7))\right),$$
$$\left(b_{20},(\delta_1,(0.9,0.3,0.7)),(\delta_2,(0.5,0.3,0.5))(\delta_3,(0.7,0.3,0.7)),(\delta_4,(0.7,0.3,0.7))\right)$$
$$\left(\breve{b}_{13},(\delta_1,(0.7,0.3,0.7)),(\delta_2,(0.7,0.2,0.5)),(\delta_3,(0.7,0.3,0.7)),(\delta_4,(0.7,0.3,0.7))\right),$$
$$\left(\breve{b}_{17},(\delta_1,(0.9,0.3,0.7)),(\delta_2,(0.7,0.3,0.9)),(\delta_3,(0.7,0.3,0.7)),(\delta_4,(0.7,0.3,0.7))\right),$$
$$\left(b_{21},(\delta_1,(0.9,0.3,0.7)),(\delta_2,(0.5,0.3,0.5)),(\delta_3,(0.7,0.3,0.7)),(\delta_4,(0.7,0.3,0.7))\right)$$
$$\left(\breve{b}_{14},(\delta_1,(0.7,0.3,0.7)),(\delta_2,(0.7,0.2,0.5)),(\delta_3,(0.7,0.3,0.7)),(\delta_4,(0.7,0.3,0.7))\right),$$
$$\left(\breve{b}_{18},(\delta_1,(0.9,0.3,0.7)),(\delta_2,(0.7,0.3,0.9)),(\delta_3,(0.7,0.3,0.7)),(\delta_4,(0.7,0.3,0.7))\right),$$
$$\left(b_{22},(\delta_1,(0.9,0.3,0.7)),(\delta_2,(0.5,0.3,0.5)),(\delta_3,(0.7,0.3,0.7)),(\delta_4,(0.7,0.3,0.7))\right)$$

Definition 5

The interval-valued neutrosophic hypersoft set is defined as

$\left\{\left[\boldsymbol{\sigma}^{L}_{S(\breve{b}_t)}(\boldsymbol{G}),\boldsymbol{\sigma}^{U}_{S(\breve{b}_t)}(\boldsymbol{G})\right],\left[\boldsymbol{\tau}^{L}_{S(\breve{b}_t)}(\boldsymbol{G}),\boldsymbol{\tau}^{U}_{S(\breve{b}_t)}(\boldsymbol{G})\right],\left[\boldsymbol{\gamma}^{L}_{S(\breve{b}_t)}(\boldsymbol{G}),\boldsymbol{\gamma}^{U}_{S(\breve{b}_t)}(\boldsymbol{G})\right]\right\}$, where $0 \leq \boldsymbol{\sigma}^{U}_{S(\breve{b}_t)}(\boldsymbol{G}) + \boldsymbol{\tau}^{L}_{S(\breve{b}_t)}(\boldsymbol{G}) + \boldsymbol{\gamma}^{L}_{S(\breve{b}_t)}(\boldsymbol{G}) \leq 3$.

Definition 6

The concept of the CC can be defined as

$$\delta_{IVNHSS}((S,\ddot{B}),(C,\ddot{O})) = \frac{C_{IVNHSS}((S,\ddot{B}),(C,\ddot{O}))}{\sqrt{G_{IVNHSS}(S,\ddot{B})} * \sqrt{G_{IVNHSS}(C,\ddot{O})}}$$

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Definition 7

The correlation between two numbers of IVNHSS can be defined as

$$C_{IVNHSS}((S,\ddot{B}),(C,\ddot{O})) = \sum_{t=1}^{m}\sum_{i=1}^{n}\begin{pmatrix} \sigma^{L}_{S(\breve{b}_t)}(\delta_i) * \sigma^{L}_{C(\breve{b}_t)}(\delta_i) + \sigma^{U}_{S(\breve{b}_t)}(\delta_i) * \sigma^{U}_{C(\breve{b}_t)}(\delta_i) + \tau^{L}_{S(\breve{b}_t)}(\delta_i) * \tau^{L}_{C(\breve{b}_t)}(\delta_i) \\ +\tau^{U}_{S(\breve{b}_t)}(\delta_i) * \tau^{U}_{C(\breve{b}_t)}(\delta_i) + \\ \gamma^{L}_{S(\breve{b}_t)}(\delta_i) * \gamma^{L}_{C(\breve{b}_t)}(\delta_i) + \gamma^{U}_{S(\breve{b}_t)}(\delta_i) * \gamma^{U}_{C(\breve{b}_t)}(\delta_i) \end{pmatrix}$$

Definition 8

The weighted correlation between IVNHSS can be defined as:

$$\delta^{1}_{WIVNHSS}((S,\ddot{B}),(C,\ddot{O})) = \frac{\sum_{t=1}^{m}\Omega_t\left(\sum_{i=1}^{n}\gamma_i\begin{pmatrix}\sigma^{L}_{S(\breve{b}_t)}(\delta_i)*\sigma^{L}_{C(\breve{b}_t)}(\delta_i)+\sigma^{U}_{S(\breve{b}_t)}(\delta_i)*\sigma^{U}_{C(\breve{b}_t)}(\delta_i)+\tau^{\ell}_{S(\breve{b}_t)}(\delta_i)*\tau^{\ell}_{C(\breve{b}_t)}(\delta_i)+\\ \tau^{U}_{S(\breve{b}_t)}(\delta_i)*\tau^{U}_{C(\breve{b}_t)}(\delta_i)+\\ \gamma^{\ell}_{S(\breve{b}_t)}(\delta_i)*\gamma^{\ell}_{C(\breve{b}_t)}(\delta_i)+\\ \gamma^{U}_{S(\breve{b}_t)}(\delta_i)*\gamma^{U}_{GC(\breve{b}_t)}(\delta_i)\end{pmatrix}\right)}{max\begin{Bmatrix}\sum_{k=1}^{m}\Omega_k\left(\sum_{i=1}^{n}\gamma_i\begin{pmatrix}\left(\sigma^{\ell}_{S(\breve{b}_t)}(\delta_i)\right)^2+\left(\sigma^{U}_{S(\breve{b}_t)}(\delta_i)\right)^2+\left(\tau^{\ell}_{S(\breve{b}_t)}(\delta_i)\right)^2+\\ \left(\tau^{U}_{S(\breve{b}_t)}(\delta_i)\right)^2+\left(\gamma^{\ell}_{S(\breve{b}_t)}(\delta_i)\right)^2+\\ \left(\gamma^{U}_{S(\breve{b}_t)}(\delta_i)\right)^2\end{pmatrix}\right), \\ \sum_{k=1}^{m}\dot{\omega}_k\left(\sum_{k=1}^{m}\Omega_k\left(\sum_{i=1}^{n}\gamma_i\begin{pmatrix}\left(\sigma^{\ell}_{C(\breve{b}_t)}(\delta_i)\right)^2+\left(\sigma^{U}_{C(\breve{b}_t)}(\delta_i)\right)^2+\\ \left(\tau^{\ell}_{C(\breve{b}_t)}(\delta_i)\right)^2+\left(\tau^{U}_{C(\breve{b}_t)}(\delta_i)\right)^2+\left(\gamma^{\ell}_{C(\breve{b}_t)}(\delta_i)\right)^2+\\ \left(\gamma^{U}_{C(\breve{b}_t)}(\delta_i)\right)^2\end{pmatrix}\right)\right)\end{Bmatrix}}$$

3. Application

Determine the criteria for the selection and assessment of ERP software that is seen as being of the utmost importance by the users.

Select the approach to use once the model has been constructed and the connections between the criteria have been outlined. This is not a decision that was made at random.

There are three criteria like criterion important to vendors, criterion relevant to the customer, and Regarding software, the requirements, and there are three alternatives to select the best alternative.

A select set of criteria and sub-criteria
Build the IVNHSS by the opinions of experts
Replace the opinions of neutrosophic by the interval value neutrosophic sets
Compute the correlation between criteria and alternatives
Compute the concept of CC as a centroid method
The highest value of CC is the best alternative and the lowest value is the worst alternative

There are three experts to evaluate the criteria and alternatives as follows:
Where E refers to the number of experts

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$$E_1 = \begin{pmatrix} \breve{b}_1, (\delta_1, [0.6,0.7]), (\delta_2, [0.2,0.1]), (\delta_3, [0.5,0.3]), \\ \breve{b}_1, (\delta_1, [0.6,0.7]), (\delta_2, [0.2,0.1]), (\delta_3, [0.5,0.3]) \\ \breve{b}_1, (\delta_1, [0.6,0.7]), (\delta_2, [0.2,0.1]), (\delta_3, [0.5,0.3]) \\ \begin{pmatrix} \breve{b}_2, (\delta_1, [0.6,0.6]), (\delta_2, [0.3,0.1]), (\delta_3, [0.2,0.5]), \\ \breve{b}_2, (\delta_1, [0.6,0.2]), (\delta_2, [0.2,0.1]), (\delta_3, [0.6,0.3]) \\ \breve{b}_2, (\delta_1, [0.6,0.3]), (\delta_2, [0.4,0.1]), (\delta_3, [0.1,0.2]) \end{pmatrix} \\ \begin{pmatrix} \breve{b}_3, (\delta_1, [0.8,0.6]), (\delta_2, [0.370.1]), (\delta_3, [0.2,0.5]), \\ \breve{b}_3, (\delta_1, [0.8,0.2]), (\delta_2, [0.5,0.3]), (\delta_3, [0.6,0.4]) \\ \breve{b}_3, (\delta_1, [0.9,0.3]), (\delta_2, [0.4,0.1]), (\delta_3, [0.1,0.2]) \end{pmatrix} \end{pmatrix}$$

$$E_2 = \begin{pmatrix} \breve{b}_1, (\delta_1, [0.9,0.7]), (\delta_2, [0.2,0.3]), (\delta_3, [0.1,0.3]), \\ \breve{b}_1, (\delta_1, [0.9,0.7]), (\delta_2, [0.2,0.3]), (\delta_3, [0.1,0.3]) \\ \breve{b}_1, (\delta_1, [0.9,0.7]), (\delta_2, [0.2,0.3]), (\delta_3, [0.1,0.3]) \\ \begin{pmatrix} \breve{b}_2, (\delta_1, [0.9,0.9]), (\delta_2, [0.3,0.3]), (\delta_3, [0.2,0.1]), \\ \breve{b}_2, (\delta_1, [0.9,0.2]), (\delta_2, [0.2,0.3]), (\delta_3, [0.9,0.3]) \\ \breve{b}_2, (\delta_1, [0.9,0.3]), (\delta_2, [0.4,0.3]), (\delta_3, [0.3,0.2]) \end{pmatrix} \\ \begin{pmatrix} \breve{b}_3, (\delta_1, [0.8,0.9]), (\delta_2, [0.370.3]), (\delta_3, [0.2,0.1]), \\ \breve{b}_3, (\delta_1, [0.8,0.2]), (\delta_2, [0.1,0.3]), (\delta_3, [0.9,0.4]) \\ \breve{b}_3, (\delta_1, [0.9,0.3]), (\delta_2, [0.4,0.3]), (\delta_3, [0.3,0.2]) \end{pmatrix} \end{pmatrix}$$

$$E_3 = \begin{pmatrix} \breve{b}_1, (\delta_1, [0.7,0.7]), (\delta_2, [0.2,0.5]), (\delta_3, [0.5,0.5]), \\ \breve{b}_1, (\delta_1, [0.7,0.7]), (\delta_2, [0.2,0.5]), (\delta_3, [0.5,0.5]) \\ \breve{b}_1, (\delta_1, [0.7,0.7]), (\delta_2, [0.2,0.5]), (\delta_3, [0.5,0.5]) \\ \begin{pmatrix} \breve{b}_2, (\delta_1, [0.7,0.7]), (\delta_2, [0.5,0.5]), (\delta_3, [0.2,0.5]), \\ \breve{b}_2, (\delta_1, [0.7,0.2]), (\delta_2, [0.2,0.5]), (\delta_3, [0.7,0.5]) \\ \breve{b}_2, (\delta_1, [0.7,0.5]), (\delta_2, [0.4,0.5]), (\delta_3, [0.5,0.2]) \end{pmatrix} \\ \begin{pmatrix} \breve{b}_3, (\delta_1, [0.8,0.7]), (\delta_2, [0.570.5]), (\delta_3, [0.2,0.5]), \\ \breve{b}_3, (\delta_1, [0.8,0.2]), (\delta_2, [0.5,0.5]), (\delta_3, [0.7,0.4]) \\ \breve{b}_3, (\delta_1, [0.7,0.5]), (\delta_2, [0.4,0.5]), (\delta_3, [0.5,0.2]) \end{pmatrix} \end{pmatrix}$$

From the previous opinions of experts, we apply the IVNHSS, then compute the correlation between criteria and alternatives to select the best alternative. So the correlation is computed and the outcome is organized as A1=0.661, A2=0.96, and A3=0.715. From the correlation, alternative 2 is the best alternative followed by alternative 3 than alternative 1. The worst alternative is 1

4. Conclusion

ERP systems play an important part in the enterprises of today, even though they are expensive and fraught with significant installation risks. Consequently, doing an analysis of the available ERP systems and deciding which of those systems is the most appropriate is a difficult undertaking. The selection issue gets more difficult to answer as the number of needs grows, and businesses are forced to make judgments in contexts that are becoming more complicated. A unique notion that is an extension of the IVNS set is being proposed, and its working title is the IVNHSS. The IVNHSS is used to evaluate the standards and options in this study. From the evaluation of IVNHSS, alternative 2 is the best alternative and alternative 1 is the worst alternative.

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