E-Leadership Is Un(usual): Multi-Criteria Analysis of Critical Success Factors for the Transition from Leadership to E-Leadership

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Abstract: Leadership helps to build strong organizations with resilient cultures. It is established that leadership needs a transition powered by digital technologies to tackle the shift from workplace culture to remote work, which is being practiced even after the pandemic to reduce operational costs and improve flexibility. The transition from leadership to e-leadership requires a profound understanding of the critical success factors (CSFs). The primary objective of this study is to identify the critical success factors of e-leadership using a systematic literature review and questionnaire survey technique. The identified CSFs are grouped under (i) Technology Management, (ii) E-Motivation and well-being, and (iii) E-change management categories. The Fuzzy Delphi technique is used to find the relevant CSFs and the relative dominance of each CSF category; the CSFs are then analyzed using the fuzzy analytical hierarchy process. The results suggest that employee engagement using digital technologies is the most critical success factor, while role clarity has relatively the least significance for the transition to take place. The findings of this study facilitate the smooth transition from leadership to e-leadership.

Keywords: E-leadership; change management; technology management; e-training; critical success factors (CSF); fuzzy set theory; Delphi; analytical hierarchy process

1. Introduction

The relationship between an organization and its leaders has been researched extensively. Leadership plays a key role in managing change in organizations [1–3]. Leadership can be briefly defined as "the process by which a person exerts his/her influence over another individual or group to achieve a common goal, with this influence being exercised in an effective way".

Sustainable organizations must pay attention not only to financial results but also to the social dimensions within the organization [4]. The social dimensions include sustainable leadership that builds an organizational culture. The pandemic has changed organizational work structure. While there are many advantages of virtual work, there are also clear challenges for organizations. Leadership styles can be adopted and leveraged by the organization to build a strong and resilient culture [1]. The role of leadership is very significant, especially during the transition [1,2]. The pandemic is one of the examples that posed numerous challenges for the leadership team due to the transition from workplace culture to remote work. The major concern in today's business is the impact of the COVID-19 pandemic. It has changed the way employees work and has led to organizational restructuring with more emphasis on digital technologies enabling flexibility and employee interaction at work and leadership styles adopted by the organizations. [3,5–7]. Remote work posed challenges in terms of readiness to work online due to resource constraints. People shared

the same workspace with their family members, which caused disruptions due to work-family spillovers [8–11]. During the pandemic, employees faced numerous challenges, such as low morale, stress, lack of motivation, and job insecurity [12]. With the passage of time, employees and organizations have tried to minimize the challenges employees face during remote work by providing them with technology and resources. Employees have also become mindful of maintaining a work-life balance [13]. Leadership plays a vital role in ensuring that employees overcome these challenges. A successful leader communicates with all stakeholders to ease their stress and address their concerns [14–16]. This results in building self-efficacy in employees. Considering the impact of leadership on employees' well-being, organizations must develop efficient leadership to ensure healthy communication and interactive decision-making [14,15,17].

Companies have reduced overhead by moving away from expensive offices [18]. Moreover, unprecedented events have proven to be an opportunity for these organizations to create a virtual work environment, implement digital transformation at the workplace, and save on costs [19–23]. Considering the gains, many organizations, especially IT companies, have asked their employees to continue working from home. In order to deal with these changes, organizations have adopted the concept of "e-leadership" to refer to those leaders who conduct many of the processes of leadership largely through digital technologies [24]. However, it may be noted that data security is a major concern in the context of remote work [25,26]. A study conducted by [27] in the context of the banking industry identified the role of transformational leadership in the development of employee security systems intention. A study conducted by [28,29] also found a significant relationship between IT governance and business performance.

E-Leadership can be defined as: the effective way and blending of electronic and traditional methods of communication, implying awareness of current information and communication technology (ICT), selective adoption of new ICT for oneself, and the organizational and technical competence in using those ICTs selected [24]. E-leadership in the e-environment context of work is mediated by information technologies [30]. However, an e-leader is not necessarily a technical expert but should know how to benefit from technology and lead efficiently. The use of electronic modes of communication poses challenges such as social isolation and family-to-work conflict [31]. E-Leaders need to (i) identify solutions, (ii) manage processes, and (iii) manage people using a virtual environment abiding by the vision and mission of the organization [24]. The transition from leadership to e-leadership is in its nascent stages, due to which organizations are not able to measure the attainment of e-leadership. Considering this gap, the following research questions were formulated for this study

RQ1: What are the critical success factors that aid in the transition from leadership to e-leadership?

RQ2: What is the priority of each critical success factor?

The objectives below are set for this study to address the above research questions.

RO1: To perform a systematic literature review and a survey to identify the wide range of critical success factors that enable the transition from leadership to e-leadership.

RO2: To analyze the hierarchy of identified critical success factors considering the responses from various IT companies in India.

The study is structured as follows. In Section 2, we concisely review the literature and present the details of the survey that helped identify the critical success factors that aid in the transition from leadership to e-leadership. A summary of the critical success factors is presented, which classifies them into different categories. The research methods are detailed in Section 3, followed by the results in Section 4. The inferences drawn from the analysis are presented in Section 5, followed by the vital conclusions in Section 6.

2. Identification of Critical Success Factors

A systematic literature review was conducted to identify critical success factors. Subsequently, the opinion of experts was taken to verify if the identified critical success factors

are relevant for the transition from leadership to e-leadership. The participants of the survey work remotely and have been part of the virtual team for a duration of at least 12 months. The sub-section below presents the details of the literature review and the primary survey. A fusion of the outcomes from the literature survey and the primary survey is complementary as non-relevant CSFs can be eliminated, and the additional relevant CSFs can be added to the list considering the recommendations. The constituted expert panel in the study comprises employees of various IT firms in India.

2.1. Literature Review

A systematic literature review (SLR) approach was adopted to identify critical success factors that contribute to the transition from leadership to e-leadership. A list of keywords including "virtual work", "remote work", "leadership", "teleworking", "virtual leadership", "virtual team", "virtual communication", "future of work", and "digital leadership" are used as a basis to identify the relevant papers in the Scopus and Web of Science repositories which are further refined using inclusion and exclusion criteria. The selected papers are then reviewed to identify the critical success factors. As a result, a total of 21 critical success factors are identified from the literature review. Table 1 presents an overview of CSF categories and the CSFs within each category. The relevance of considering each CSF in the context of the IT industry in a post-pandemic scenario is also eluded in Table 1.

Table 1. Critical success factors for the transition of leadership to e-leadership.

CSF Category	CSF	References	Description of CSF
Technology Management	Technology enabler	[32]	E-Leaders must integrate technology with the vision of the organization. E-Leaders must be technically competent and enable the use of technology to gain competitive advantage.
	E-training	[33]	E-leaders need to ensure that employees receive e-training, which is defined as a "process of distance training through the use of the Internet or Intranet, giving individuals the required knowledge about various subjects chosen".
	Leadership Support	[23,34]	Leadership support can be in the form of providing adequate resources, training, motivation, benefits, and concern for the socio-economic needs of the employees.
E-motivation and well-being	Managing Change	[35]	The transition after a pandemic is more towards e-change, where the e-leaders are required to develop the employee's skills towards the adaptation of digital technologies.
	E-mentoring	[36]	Virtual mentoring enables the exchange of information in digital space by using one or more digital platforms. E-leaders must apply e-mentoring as an intervention to ensure employees' psychological well-being.
	Managing teams	[37]	Virtual leadership has been of great importance in studying team effectiveness. E-leaders must communicate and provide feedback to the teleworkers in order to achieve team effectiveness.
	Work autonomy	[38]	Employees can manage their own time with less supervision. Work autonomy also increases employee performance as they can work from anywhere with minimal supervision.
	Role clarity	[35]	Leaders must provide role clarity to the employees, which helps them in setting standards and measuring performance.
E-change management	Concern for financial well-being	[37]	The financial health of the organization is compromised, which has been adversely affected by the crisis. Leaders need to develop strong communication with the employees and deliver a strong message to the employees that "concern for people" is always on priority for the organization.
	Building trust	[38]	Trust in a virtual context is difficult and time-consuming. E-leaders must build trust through communication, honesty, integrity, availability, and transparency.
	Mindfulness	[17]	E-leaders must be mindful and understand the psyche of virtual employees and extend support for improving well-being.

Table 1. *Cont.*

CSF Category	CSF	Reference	Description of CSF
E-change management	Communication	[24,39]	E-leaders must communicate with the employees at regular intervals and understand the emotional health of employees who are dealing with stress.
	Employee engagement	[40]	Engaging remote employees creates an open culture and creativity and generates new ideas.
	Self-leadership	[23]	Self-leadership must be exercised on employees working in a virtual set-up so that they get flexibility, minimal supervision, and are accountable for the work.
	Work appreciation	[39]	Money is not the only motivator. There are other ways of reinforcement, with work appreciation being one of the important motivators. E-leaders must provide feedback and appreciate the work on a continuous basis.
	Knowledge Sharing	[41]	E-leaders must facilitate organizational learning by building self-presence, trust, and virtual interaction.
	Feedback	[32]	The most effective e-leadership style is to conduct performance discussions with the employees and also exhibit a high degree of empathy toward them.
	Clarity of organizational goals	[39]	E-leaders should be flexible and innovative and must have a vision of the planned outcomes, which will enable the leaders to influence and build virtual teams to reach organizational goals.
	Psychological well-being	[38]	A challenging situation such as remote work can have a negative impact on employee well-being which can be overcome with the support and guidance virtually by the e-leaders.
	Rewards and Benefits	[42]	Intrinsic and extrinsic rewards and benefits can be used as motivational tools for employees working from remote locations to improve their performance and motivation.

2.2. Primary Survey

A survey was conducted with various working professionals to collect their opinions on each of the identified critical success factors enlisted in Table 1. In order to ensure that the sample is not biased, respondents were chosen from nine different companies geographically situated in 29 cities, as shown in Figure 1.
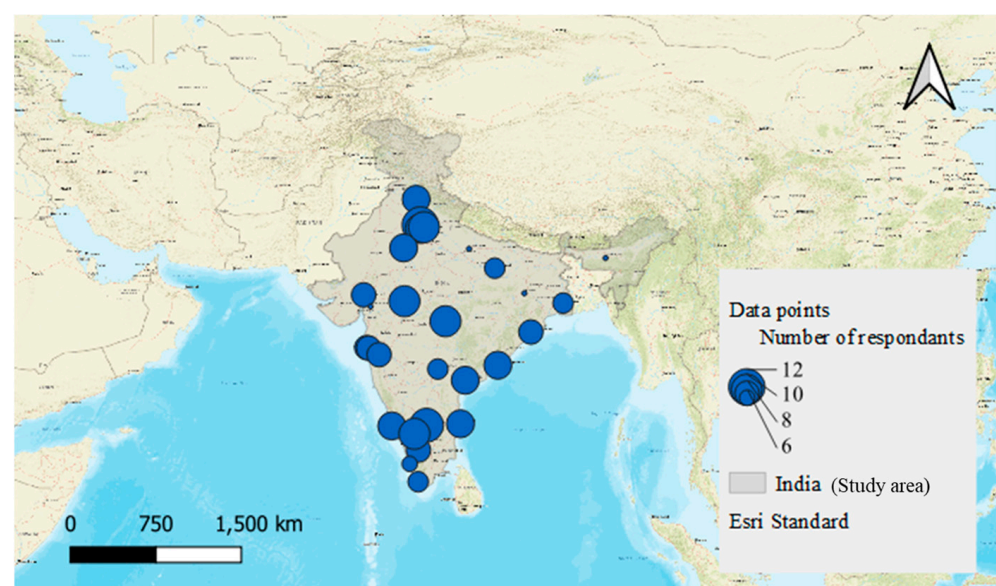
Figure 1. Geospatial distribution of respondents.

A request to participate in the survey was shared with 238 participants allowing them to opt for either a Google form-based survey or a virtual survey. With a response rate of 84%, responses were collected from the employees of various IT companies. The average time taken for each virtual interaction was nearly 24 min, and the cumulative time span taken to conduct the interview was about 1.3 months. The main objective of this survey was to collect responses from various employees working in different companies regarding the relevance of each of the critical success factors. The participating employees were asked to rate the relevance of each critical success factor using a linguistic scale presented in Appendix A. A Likert score of 1 indicates that the identified critical success factor is not relevant in the context of the transition from leadership to e-leadership, while a score of 5 indicates the critical success factor is highly relevant. Flexibility also gave participants the ability to suggest additional critical success factors. Overall, the enlisted critical success factors from the literature review helped collate the overall critical success factors, while the primary survey helped to eliminate the indicators that are not relevant in the context of post-pandemic scenarios.

The outcomes of the literature review and primary survey are complementary to each other, aiding in the identification of the CSF for the transition from leadership to e-leadership. Table 1 presents the summary of identified critical success factors that help in the transition from leadership to e-leadership literature. It is noted that past research works, especially during the time of the pandemic, have highlighted the consequences of a sudden transition from workplace culture to working from home. Studies have also addressed the key barriers associated with the transition. In view of the unforeseen changes happening, especially in the companies of the IT sector where employees are given the flexibility to work from home, it is imperative that the leadership team upgrades with digital technologies. Relatedly, there is a great need to identify various CSF that can help the leadership team ensure a smooth transition from leadership to e-leadership. Studies identifying such indicators are limited. Moreover, no study, considering that transition takes time, determined the hierarchy of critical success factors to facilitate creating the action plans for the transition. In light of this research gap, this study attempts to identify the critical success factors for implementing e-leadership with the help of an extant literature review. The relevance of each identified critical success factor is evaluated using the proposed framework built on the fuzzy Delphi theory. The proposed framework also helps in determining the relative dominance of each critical success factor in terms of the cumulative dominance score, which can eventually be used to determine the hierarchy.

3. Research Method

A framework to identify and determine the significance of critical success factors (CSF) that can aid a smooth transition from leadership to e-leadership is proposed in this study. The proposed framework is built on the fuzzy Delphi theory and analytical hierarchy process. Figure 2 presents the steps involved in this proposed technique. A detailed insight into fuzzy set theory, fuzzy Delphi theory, and the fuzzy analytical hierarchy process is given in the subsequent sections.

3.1. Fuzzy Set Theory

The perception of decision makers involved in any real-world problems cannot be crisp because of which these are often modeled using fuzzy set theory, Dempster-Shafer evidence theory, and the theory of probability [24]. The suitability of fuzzy numbers in dealing with unusual problems is well-acknowledged in the literature [25].

In this study, the uncertainty associated with the perception of experts is captured using the triangular fuzzy number (TfN). Figure 3 presents the graphical representation of the triangular membership function, while Equation (1) presents the mathematical

representation of a fuzzy number. From Figure 3, it can be interpreted that the lower and upper bounds of the fuzzy membership function are 0 and 1 [24].

$$\mu_R(x) = \begin{cases} 0 & if \ x \leq \alpha \\ \frac{x-p}{q-p} & if \ \alpha \leq x \leq \beta \\ \frac{r-x}{r-q} & if \ \beta \leq x \leq \gamma \\ 0 & if \ x \geq \gamma \end{cases}. \tag{1}$$
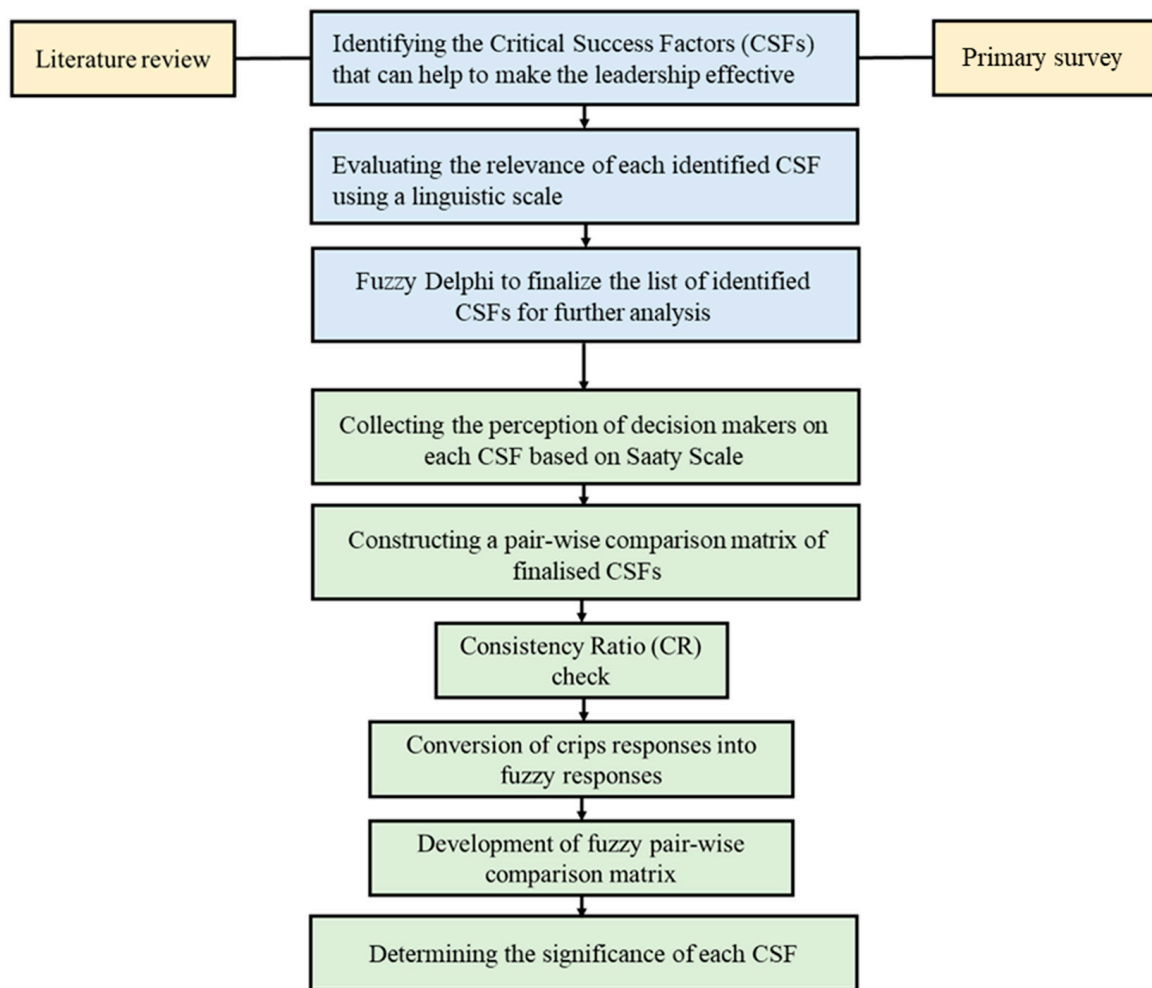
Figure 2. Proposed framework to study the significance of each CSF in implementing e-leadership.
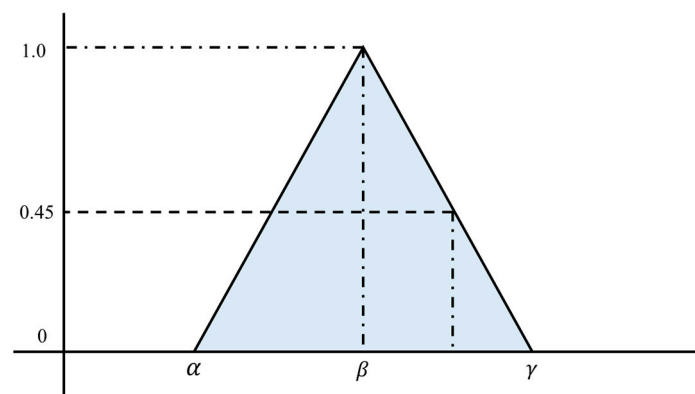
Figure 3. Graphical representation of a triangular fuzzy membership function.

3.2. Fuzzy Delphi Technique

The list of identified CSFs and their relevance in view of the transition from leadership to e-leadership are evaluated in the first phase using the fuzzy Delphi technique. The steps involved in evaluating the relevance are explained below.

Step-1: In this phase of analysis, the cumulative list of CSFs created using an extant literature review complemented by the inputs from experts is tabulated in the form of a questionnaire (refer to Appendix A) and is floated among the group of experts.

Step-2: In this step, the participating group of experts evaluates each of the identified CSFs using a linguistic scale, as shown in Table 2. The fuzzy score corresponding to each linguistic scale is also apparent in Table 2. Since the perception is collected from a group of experts, Equation (2) is used to derive the representative score corresponding to each CSF.

$$E_b^\omega = \left[\min(\alpha_{be}), \quad \left(\prod_{e=1}^n \beta_{be} \right)^{1/n}, \quad \max(\gamma_{be}) \right]. \tag{2}$$

where, $b = 1, 2, 3 \ldots n$ experts; $\omega = 1, 2, 3 \ldots \ldots k$ CSFs.

Table 2. Linguistic scale adopted to capture the perception of the expert.

Linguistic Scale	Description	Fuzzy Score (α, β, γ)
VL	It is of very low relevance	(0, 0, 0.1)
L	It has low relevance	(0, 0.1, 0.3)
ML	It has medium-low relevance	(0.1, 0.3, 0.5)
M	It has medium relevance	(0.3, 0.5, 0.7)
MH	It has medium-high relevance	(0.5, 0.7, 0.9)
H	It has high relevance	(0.7, 0.9, 1.0)
VH	It has very high relevance	(0.9, 1.0, 1.0)

Step-3: This is the last step of phase-1 analysis, where the representative fuzzy score obtained using Equation (2) is converted into a crisp number using Equation (3).

$$E_b^d = \left[\frac{\min(p_{be}) + \left(\prod_{e=1}^n q_{be} \right)^{1/n} + \max(r_{be})}{3} \right]. \tag{3}$$

3.3. Fuzzy AHP

The outcomes of phase-1 analysis, i.e., using fuzzy Delphi, help only to finalize the list of CSFs that are relevant in the current scenario, i.e., during the transition from leadership to e-leadership. On the other hand, analyzing all the finalized CSFs using fuzzy AHP helps in determining the relative dominance of each CSF, which can subsequently be used to plan the transition. The following steps outline the procedure involved in fuzzy AHP.

Step-1: Choosing an appropriate judgment scale

Analysis using FAHP starts with the selection of an appropriate scale for collecting the response from the expert panel. This study adopted a Saaty scale [43], enabling the experts to rate the relative dominance of considered CSF over the other. Figure 4 presents the graphical representation of the Saaty scale and the corresponding fuzzy Saaty scale constructed with an offset value of 1 which can be varied considering the variation in the responses.
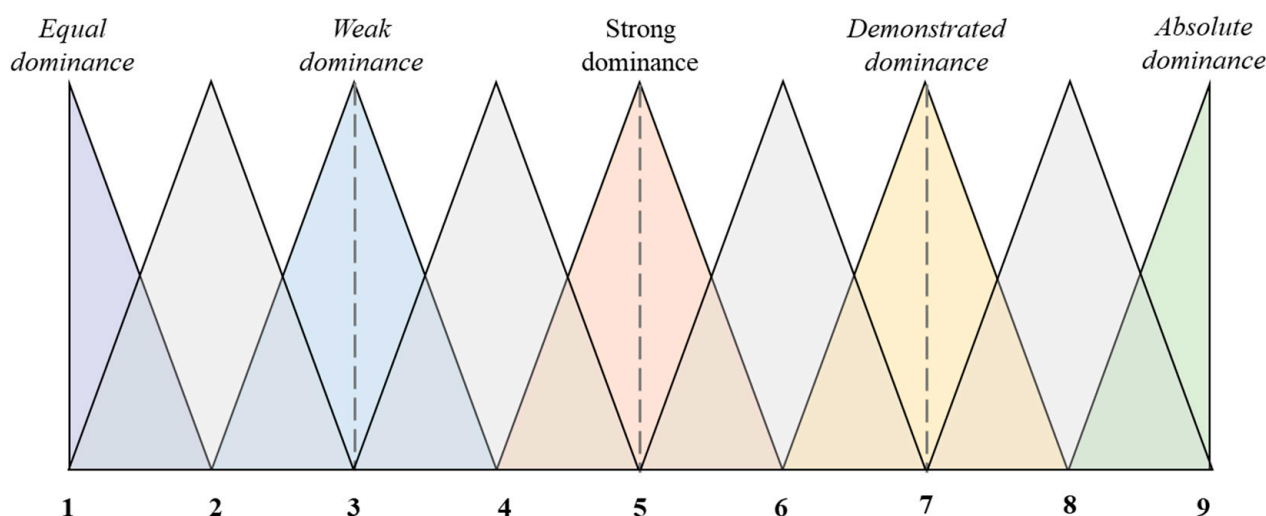
Figure 4. Saaty scale used for collecting the responses from the expert panel.

Step-2: Pair-wise comparison matrices

The obtained responses from each of the experts are used to create a pair-wise decision matrix that aids in interpreting the relative dominance of one CSF over the other. The responses obtained from all the experts in the panel are converted into a representative sample using the average method and are further used in constructing the pair-wise construction matrix. The generic representation of the pair-wise comparison matrix is presented in Equation (4). The developed matrix will further be used to evaluate the consistency ratio (CR) using Equation (5).

$$E = \begin{pmatrix} r_{11} & \cdots & r_{1N} \\ \vdots & r_{22} & \vdots \\ r_{N1} & \cdots & r_{NN} \end{pmatrix}. \tag{4}$$

where $r_{ij} = 1$ for the diagonal members of the matrix, and $r_{ij} = 1/r_{ji}$

$$CR = \frac{\left(\frac{\lambda_{max} - n}{n-1} \right)}{RI}. \tag{5}$$

where, λ_{max} is the maximum eigenvalue, n is the dimension of the pair-wise comparison matrix, CR is the consistency ratio, and RI is the random index which varies with the dimension of the matrix, as shown in Table 3.

Table 3. Dimension of the matrix and the corresponding random index (RI).

n	1	2	3	4	5	6	7	8	9	10
RI	0.00	0.00	0.58	0.9	1.12	1.24	1.32	1.41	1.46	1.49

Step-3: Evaluating the significance of each CSF

The relative significance of each CSF is analyzed using the Extent Analysis (CEA) method. The procedure for evaluating the weights is discussed below.

Let, A = {a_1, a_2, a_3, ...a_n} is the set of objects

O = {o_1, o_2, o_3, . . . o_n} is the set of goals

As per CEA analysis, the extent of an object with respect to each of the goals is to be quantified. Since fuzzy numbers are used to capture the extent, the fuzzy extent value is computed for each goal (o_i) using TfN.

If 'φ' indicates the number of CEA values of each object represented as Equation (6), the fuzzy extent value of any object can be evaluated using Equation (7).

$$\varphi_{0i}^1, \varphi_{0i,}^2 \varphi_{0i}^3, \varphi_{0i}^4, \varphi_{0i,}^5 \ldots \ldots \ldots \ldots \varphi_{0i}^\varphi, i = 1, 2, \ldots n \tag{6}$$

$$N_i = \sum_{j=1}^{v} \varphi_{0i}^j \otimes \left[\sum_{i=1}^{n} \sum_{j=1}^{v} \varphi_{gi}^j \right]^{-1} \tag{7}$$

where φ_{gi}^j ($j = 1,2,3 \ldots \varphi$) are all triangular fuzzy numbers, and m represents the number of extent analysis values for each object.

In this equation, φ_{gi}^j ($j = 1,2 \ldots \varphi$) are TfNs, and m indicates the number of CEA values for each object.

For the computation $\sum_{j=1}^{m} \varphi_{0i}^j$ and $\left[\sum_{i=1}^{n} \sum_{j=1}^{v} \varphi_{gi}^j \right]^{-1}$ a fuzzy addition operation is performed using Equations (8) and (9), respectively.

$$\sum_{j=1}^{m} \varphi_{0i}^j = \left(\sum_{j=1}^{v} \alpha_i, \sum_{j=1}^{v} \beta_i, \sum_{j=1}^{v} \gamma_i \right) \tag{8}$$

$$\left[\sum_{i=1}^{n} \sum_{j=1}^{v} \varphi_{0i}^j \right]^{-1} = \left[\frac{1}{\sum_{i=1}^{n} \gamma_i}, \frac{1}{\sum_{i=1}^{n} \beta_i}, \frac{1}{\sum_{i=1}^{n} \alpha_i} \right] \tag{9}$$

where N_i is a normalized fuzzy number with medium values of unity and $i = 1 \ldots$ C (number of criteria).

4. Results

4.1. Finalisation of Critical Success Factors

A total of 21 CSFs that can be grouped under technology management, e-motivation and well-being, and e-change management categories were identified in the extant literature review, complemented by the responses obtained from a group of identified experts. Since obtaining a crisp response in a real-world problem is challenging, responses in this study were collected using a linguistic scale. Furthermore, it is possible that the perception of a considered CSF varies by expert. In this regard, the concept of fuzzy is used in this study. The questionnaire presented in Appendix A was floated among the experts, and the responses were obtained on a linguistic scale. Later, the obtained linguistic scale was converted into fuzzy numbers and then aggregated to generate a representative score. Finally, the presented score was converted into crisp numbers, as shown in Table 4. A threshold score of 0.6 is considered to finalize the list of CSFs. The CSFs with a crisp score of less than 0.6 are eliminated for the phase-2 analysis while the rest are considered.

Table 4. Relevance of the identified critical success factors.

S. No	Critical Success Factor	Linguistic Score *	Fuzzy Score	Defuzzified Score
1	Technology enabler	MH	(0.5, 0.7, 0.9)	0.70
2	E-training	VH	(0.9, 1.0, 1.0)	0.96
3	Leadership support	H	(0.7, 0.9, 1.0)	0.86
4	Knowledge sharing	M	(0.3, 0.5, 0.7)	0.50
5	Managing change	H	(0.7, 0.9, 1.0)	0.86

Table 4. *Cont.*

S. No	Critical Success Factor	Linguistic Score *	Fuzzy Score	Defuzzified Score
6	E-mentoring	H	(0.7, 0.9, 1.0)	0.86
7	Team management	MH	(0.5, 0.7, 0.9)	0.70
8	Work autonomy	MH	(0.5, 0.7, 0.9)	0.70
9	Role clarity	MH	(0.5, 0.7, 0.9)	0.70
10	Clarity of organizational goals	ML	(0.1, 0.3, 0.5)	0.30
11	Feedback	L	(0, 0.1, 0.3)	0.13
12	Concern for financial well-being	VH	(0.9, 1.0, 1.0)	0.96
13	Building trust	VH	(0.9, 1.0, 1.0)	0.96
14	Emotional stability	VL	(0, 0, 0.1)	0.03
15	Communication	VH	(0.9, 1.0, 1.0)	0.96
16	Employee engagement	VH	(0.9, 1.0, 1.0)	0.96
17	Self -leadership	MH	(0.5, 0.7, 0.9)	0.70
18	Work appreciation	MH	(0.5, 0.7, 0.9)	0.70
19	Mindfulness	ML	(0.1, 0.3, 0.5)	0.30
20	Psychological well-being	M	(0.3, 0.5, 0.7)	0.50
21	Rewards and benefits	ML	(0.1, 0.3, 0.5)	0.30

Note: * indicates the responses obtained from one of the experts in the panel.

The finalized list of CSFs after performing fuzzy Delphi was shared with the experts, and they were allowed to nominate a suitable CSF from the eliminated list to be considered for the analysis. However, no reservations have been received from the experts. Therefore, three CSFs from the category of technology management, seven CSFs from the e-change management category, and five CSFs from the category of e-motivation and well-being are finalized from fuzzy Delphi and considered for further analysis in phase-2.

4.2. Evaluating the Relative Significance of Finalized CSFs

Considering the list of finalized CSFs and their categories, a hierarchy model is formulated, as shown in Figure 5. Level-1 indicates the objective of this study. The category of CSFs is listed under level-2, as shown in Figure 5. CSFs that fall under each of the categories are listed in level-3.

After developing the hierarchy model, pair-wise comparison matrices showing the relative dominance of each CSF are formulated using the responses obtained from the expert panel. A sample pair-wise comparison matrix showing the relative dominance of CSF categories and the list of CSFs in the category of e-motivation and well-being is shown in Equation (10) and Equation (11), respectively. Equivalent matrices are developed for the CSFs of the other two categories, i.e., technology management and e-change management. The consistency ratio of each decision matrix is evaluated, and it is noted that CR ranges between 0.04 and 0.08, which is within the permissible limit (<0.1), as suggested by Puppala et al. (2022) [44].
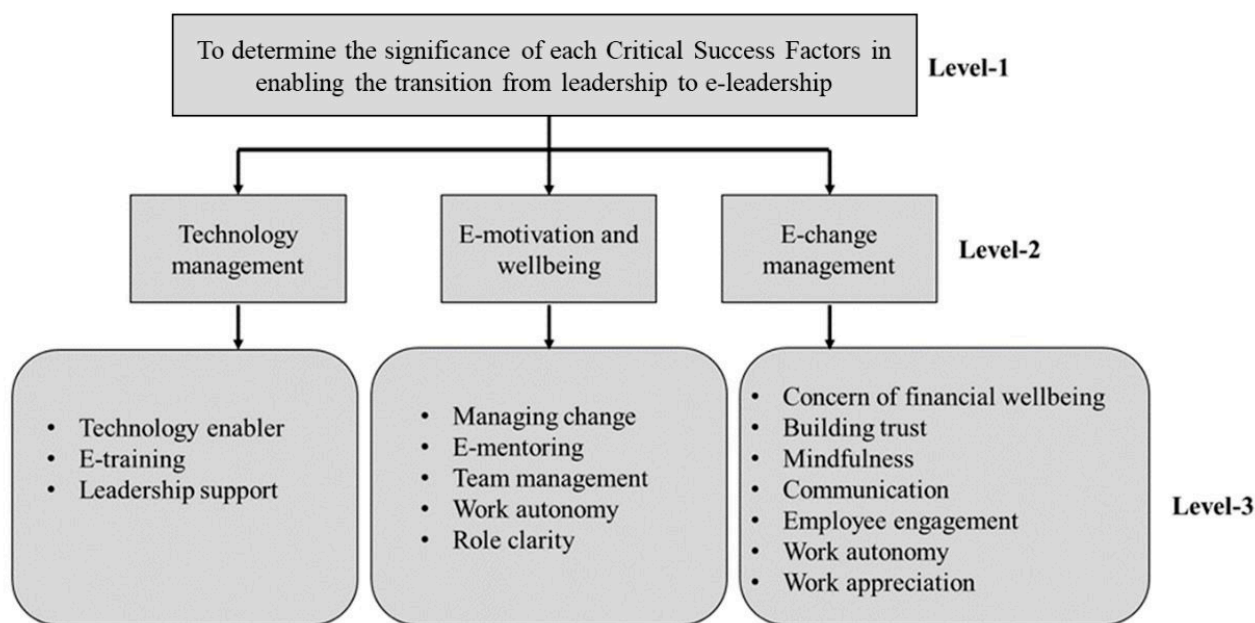
Figure 5. Hierarchy model to determine the significance of CSFs for implementing e-leadership.

The crisp ratings shown in Equations (10) and (11) are further fuzzified using the scale shown in Figure 4. Tables 5 and 6 present the fuzzified matrices corresponding to Equations (10) and (11), respectively. The fuzzy pair-wise comparison matrices are eventually used to determine the overall dominance of each CSF category and the CSFs in each category using Equations (6)–(9). The evaluated overall dominance is eventually defuzzified into a crisp number using the mean method, which can be represented mathematically using Equation (12).

$$\begin{pmatrix} & TM & MWB & CM \\ TM & 1.0 & 0.14 & 0.25 \\ MWB & 7.0 & 1.0 & 7.0 \\ CM & 4.0 & 0.14 & 1.0 \end{pmatrix}. \tag{10}$$

$$\begin{pmatrix} & FWB & BT & M & C & EE & SL & WA \\ FWB & 1 & 8.0 & 7.0 & 6.0 & 0.14 & 7.0 & 8.0 \\ BT & 0.13 & 1 & 7.0 & 7.0 & 0.17 & 6.0 & 6.0 \\ M & 0.14 & 0.14 & 1 & 0.17 & 0.14 & 0.14 & 0.25 \\ C & 0.17 & 0.14 & 6.0 & 1 & 0.14 & 6.0 & 6.0 \\ EE & 7.0 & 6.0 & 7.0 & 7.0 & 1 & 7.0 & 7.0 \\ SL & 0.14 & 0.17 & 7.0 & 0.17 & 0.14 & 1 & 5.0 \\ WA & 0.13 & 0.17 & 4.0 & 0.17 & 0.14 & 0.2 & 1 \end{pmatrix} \tag{11}$$

$$S = \frac{(\alpha + \beta + \gamma)}{3} \tag{12}$$

Table 5. Fuzzy pair-wise comparison matrix of CSF categories.

	TM			MWB			CM		
	a	**b**	**c**	**A**	**b**	**c**	**a**	**b**	**c**
TM	1	1.00	2.0	0.125	0.14	0.167	0.2	0.25	0.33
MWB	0.125	0.14	0.16	1.0	1.00	2.0	6.0	7.00	8.0
CM	0.2	0.25	0.33	0.111	0.11	0.125	1.0	1.00	2.0

Note: TM—Technology Management, CM—E-change management, MW—E-Motivation and Well-being.

Table 6. Fuzzy pair-wise comparison matrix of CSFs in e-motivation and well-being.

	FWB			BT			M			C			EE			SL			WA		
	a	b	c	a	b	c	a	b	c	a	b	c	a	b	c	a	b	c	a	b	c
FWB	1.00	1.00	2.00	7.00	8.00	9.00	6.00	7.00	8.00	5.00	6.00	7.00	0.125	0.14	0.167	6.00	7.00	8.00	7.00	8.00	9.00
BT	0.11	0.13	0.143	1.00	1.00	2.00	6.00	7.00	8.00	6.00	7.00	8.00	0.143	0.17	0.2	5.00	6.00	7.00	5.00	6.00	7.00
M	125	0.14	0.167	0.125	0.14	0.167	1.00	1.00	2.00	0.143	0.17	0.20	0.125	0.14	0.167	0.125	0.14	0.167	0.20	0.25	0.33
C	0.143	0.17	0.2	0.125	0.14	0.167	5.00	6.00	7.00	1.00	1.00	2.00	0.125	0.14	0.167	5.00	6.00	7.00	5.00	6.00	7.00
EE	6.00	7.00	8.00	5.00	6.00	7.00	6.00	7.00	8.00	6.00	7.00	8.00	1.00	1.00	2.00	6.00	7.00	8.00	6.00	7.00	8.00
SL	0.125	0.14	0.167	0.143	0.17	0.20	6.00	7.00	8.00	0.143	0.17	0.20	0.125	0.14	0.167	1.00	1.00	2.00	4.00	5.00	6.00
WA	0.111	0.13	0.143	0.143	0.17	0.20	3.00	4.00	5.00	0.143	0.17	0.20	0.125	0.14	0.167	0.167	0.20	0.25	1.00	1.00	2.00

Note: FWB—Concern of financial well-being, BT—Building Trust, M—Mindfulness, C—Communication, EE—Employee Engagement, SL—Self-leadership, WA—Work Appreciation.

Table 7 presents the fuzzy and crisp score of each CSF category, from which it is apparent that e-motivation and well-being obtained the highest priority. E-change management and technology management follow the priority order.

Table 7. Fuzzy and defuzzified weights of CSF categories.

CSF Category	α	β	γ	Defuzzified
E-change management	0.087	0.127	0.256	0.150
E-Motivation and well-being	0.471	0.747	1.041	0.752
Technology management	0.086	0.124	0.251	0.147

Similarly, the overall dominance of each CSF within the other two categories is computed. The overall dominance of each CSF within each category is referred to as local weight, and the priority drawn based on it is referred to as a local priority. Correspondingly, the weights obtained after multiplying the local weights with the overall dominance of category weights are referred to as global weights, and the hierarchy drawn is known as global rank. Table 8 presents the local and global weights of each CSF. The results show that 'managing teams' should be given the highest preference while the transition from leadership to e-leadership takes place.

Table 8. Local and global weight of each CSF obtained after defuzzification.

CSF Category	CSF	Local Weight	Global Weight
Technology management (w = 0.147)	Technology enabler	0.062	0.009
	E training	0.677	0.100
	Leadership support	0.291	0.043
E-change management (w = 0.15)	Managing change	0.238	0.036
	E-mentoring	0.356	0.053
	Managing teams	0.216	0.032
	Work autonomy	0.190	0.029
	Role clarity	0.024	0.004

Table 8. *Cont.*

CSF Category	CSF	Local Weight	Global Weight
Motivation and well-being (w = 0.752)	Concern for financial well-being	0.257	0.194
	Building trust	0.190	0.143
	Mindfulness	0.016	0.012
	Communication	0.136	0.102
	Employee engagement	0.291	0.219
	Self-leadership	0.096	0.072
	Work appreciation	0.042	0.032

5. Sensitivity Analysis

Sensitivity analysis is one of the most robust techniques to validate a developed framework or model. Any proposed model works differently in varied working conditions. Many studies have been analyzed using sensitivity analysis to test the framework; hence, the present study also uses the analysis by changing the experts' inputs to validate the framework. The category of 'e-motivation and well-being' (MWB) is the most significant CSF category, and e-change management (ECM) is the second highest risk; this implies that a slight change in the weights of these CSFs can influence the other CSFs significantly. 'Employee engagement' obtained the first rank, as apparent in Table 9. Accordingly, a natural method is to change the considered factor proportionally—as considered in this work for the sensitivity analysis. Therefore, e-motivation and well-being weights are changed from 0.752 (MWB) to 0.752*0.9 = 0.677, 0.752*0.8 = 0.602, 0.752*0.7 = 0.526, 0.752*0.6 =0.451, 0.752*0.5 = 0.376, 0.752*0.4 = 301, 0.752*0.3 = 0.226, 0.752*0.2 = 0.150 and 0.752*0.1 = 0.075. The sensitivity analysis shows that maximum change occurs in the 'e-motivation and well-being' category, as apparent in Table 9. Considering the variation of CSF category weights, the overall weight of each CSF is also evaluated, and the variation is shown in Figure 6. The hierarchy of CSFs with the change in weights is evaluated, and the attributes are presented in Table 10.

Table 9. CSF values when increasing e-motivation and well-being values.

	Normal	MWB m = 0.9	MWB m = 0.8	MWB m = 0.7	MWB m = 0.6	MWB m = 0.5	MWB m = 0.4	MWB m = 0.3	MWB m = 0.2	MWB m = 0.1
TM	0.147	0.184	0.221	0.259	0.296	0.333	0.370	0.408	0.445	0.482
CM	0.150	0.188	0.226	0.264	0.302	0.340	0.378	0.416	0.454	0.492
MWB	0.752	0.677	0.602	0.526	0.451	0.376	0.301	0.226	0.150	0.075

Table 10. Sensitivity of hierarchy to the change in weightage of MWB.

	CSF	N *	€ = 0.9	€ = 0.8	€ = 0.7	€ = 0.6	€ = 0.5	€ = 0.4	€ = 0.3	€ = 0.2	€ = 0.1
1	Technology enabler	14.0	13.0	13.0	13.0	13.0	12.0	12.0	11.0	10.0	7.00
2	E training	5.00	4.00	3.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
3	Leadership support	8.00	8.00	7.00	6.00	5.00	4.00	3.00	3.00	3.00	3.00
4	Managing change	9.00	9.00	9.00	8.00	7.00	6.00	4.00	4.00	4.00	4.00
5	E-mentoring	7.00	6.00	6.00	5.00	4.00	2.00	2.00	2.00	2.00	2.00
6	Managing teams	10.0	10.0	10.0	9.00	8.00	7.00	6.00	5.00	5.00	5.00
7	Work autonomy	12.0	11.0	11.0	11.0	10.0	9.00	8.00	6.00	6.00	6.00
8	Role clarity	15.0	15.0	15.0	15.0	14.0	14.0	14.0	13.0	13.0	11.0

Table 10. *Cont.*

	CSF	N *	€ = 0.9	€ = 0.8	€ = 0.7	€ = 0.6	€ = 0.5	€ = 0.4	€ = 0.3	€ = 0.2	€ = 0.1
9	Concern for financial well-being	2.00	2.00	2.00	3.00	3.00	5.00	7.00	8.00	8.00	9.00
10	Building trust	3.00	3.00	4.00	4.00	6.00	8.00	9.00	9.00	9.00	10.0
11	Emotional stability	13.0	14.0	14.0	14.0	15.0	15.0	15.0	15.0	15.0	15.0
12	Communication	4.00	5.00	5.00	7.00	9.00	10.0	10.0	10.0	11.0	12.0
13	Employee engagement	1.00	1.00	1.00	2.00	2.00	3.00	5.00	7.00	7.00	8.00
14	Self-leadership	6.00	7.00	8.00	10.0	11.0	11.0	11.0	12.0	12.0	13.0
15	Work appreciation	11.0	12.0	12.0	12.0	12.0	13.0	13.0	14.0	14.0	14.0

Note: N * indicates the case analyzed by considering the weights obtained using fuzzy AHP.
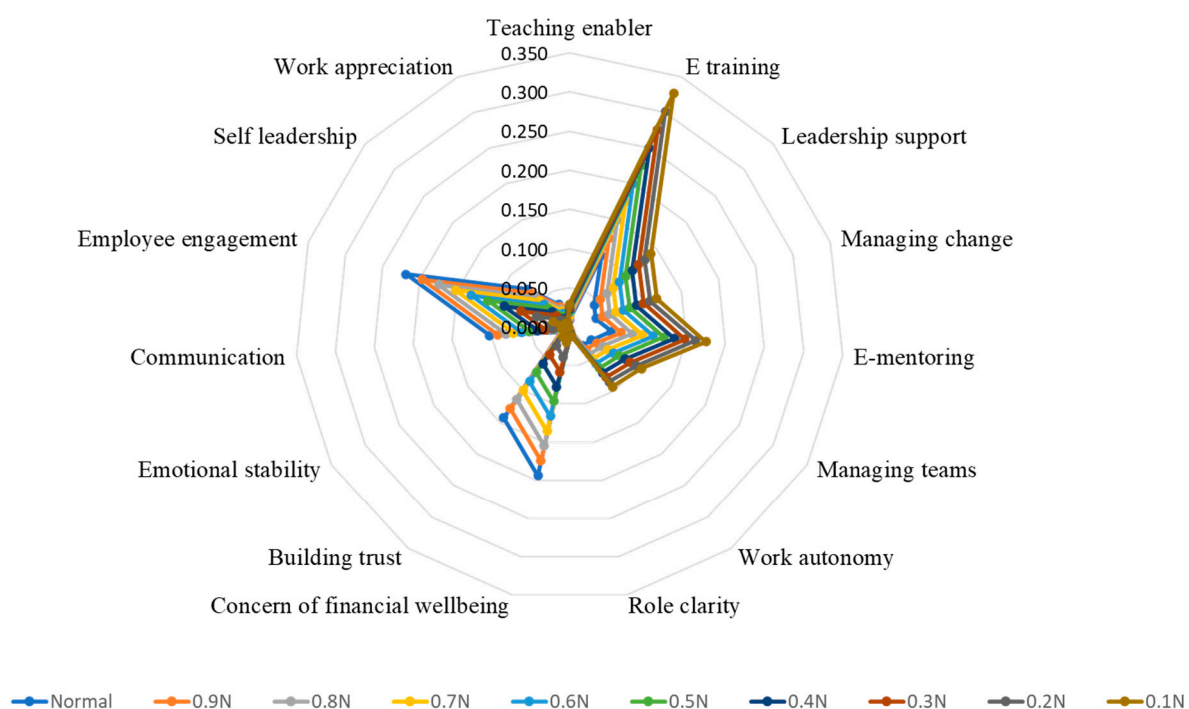
Figure 6. Sensitivity of overall weights to the change in weights of "E-motivation and well-being" category.

6. Discussion

From the evaluated weight of each CSF category, as shown in Table 6, it is evident that the category 'e-motivation and well-being' is a prime dimension for the success of e-leadership. E-leaders must communicate with employees, build trust, and engage with employees to boost their performance and well-being. Motivating employees is essential for continuing work, adopting new skills, and understanding the nuances of virtual work. Leaders must motivate employees by appreciating their work, as it can be one of the most influential motivators during remote work. A leader must be sensitive toward employees' feelings and emotions, as managing work life during remote work is challenging. The leaders must appreciate not only the work and output but also the efforts made by the employee. Leaders should have a concern for financial well-being and train the employees in saving funds, as the crisis has created financial issues for organizations and employees alike. Hence, leadership support is required in terms of concern for financial well-being.

In the category of 'E-motivation and well-being', employee engagement (EE), with a weighted score of 0.291, is ranked first, indicating it is the most essential to engage employees in turbulent times. This observation is in line with the studies of [45,46]. Em-

ployee engagement can impact emotional well-being, performance, motivation, and job satisfaction [45–47]. Leaders during the transition to e-leaders must engage with their employees by using different techniques, including video conferencing, team building activities, e-learning, online competitions, and get-together events. A poor transition from leadership to e-leadership may make employees feel isolated, which can consequently impact the well-being of employees.

'Concern for financial well-being' holds the second position with a weighted score of 0.257, and 'building trust' is in the third position with a weighted score of 0.19. Due to the negative impact on the financial health of the organization, employees had to suffer by losing their jobs and income. Leaders need to develop strong communication about "concern for people" as the priority to overcome this barrier, which is also the fact highlighted in the study by [32]. E-leaders must build trust among employees as it provides a platform where employees can share their concerns openly. Trust ensures employee loyalty and performance as employees follow their leader if they have faith in the leader [33].

'Communication' holds the fourth position with a weighted score of 0.136. Communication is one of the most important tools for successful leadership. E-leaders must know how to use communication as a medium to motivate employees and improve their performance. In a virtual workspace, communication takes place using videoconferencing and other ICT tools. The importance of both formal and informal communication with employees and its impact on employee well-being are highlighted in various studies [34]. Self-leadership, work appreciation, and mindfulness (emotional stability) hold the fifth, sixth, and seventh positions with weight scores of 0.096, 0.042, and 0.016, respectively.

'E-Change Management' is ranked second with a weighted score of 0.15. In this category, e-mentoring holds the highest priority, with a weighted score of 0.356. Different forms of mentoring have been developed to enhance employee skills in response to a changing workplace [35]. E-mentoring is a social construction that uses digital technologies tools and has received considerable attention with respect to remote workers' performance [48]. E-leaders must mentor their employees to provide support and training. Mentors guide, suggest, coach, and develop their mentees and are considered 'great problem solvers' by their employees. 'Managing change' occupies the second rank among all the processes. Change management is the most crucial factor in managing virtual employees. E-leaders must communicate change in the most effective manner, drive the employees towards the change and make the transition smooth for the employees [35]. 'Managing teams', 'work autonomy', and 'role clarity' are ranked third, fourth, and fifth with weight scores of 0.216, 0.190, and 0.024, respectively. By providing work autonomy, e-leaders will be able to build trust and improve team effectiveness and performance. Role clarity is equally important as change brings disruption and creates confusion when it comes to the role of employees' expectations.

'Technology management' holds the third position with a dominance score of 0.147. E-leaders must be able to introduce and manage technology so that the employees optimally utilize resources. If the employees are not able to manage technology, it will result in employee stress, resistance to change, and failure of work [37,49,50]. 'E-training', also called virtual training, has obtained the highest rank with a weighted score of 0.677. Leaders need to train employees in the use of information and communication technology. Remote work requires employees to use platforms such as "Google Meet", "Zoom", "Webex", and many more to communicate and present work in teams, etc. Hence, employees must be trained to use these platforms and other software and online tools [38]. 'Leadership support' and 'technology enabler' are ranked second and third with weighted scores of 0.291 and 0.062, respectively. Leaders must provide support by making employee training, providing work autonomy, and appreciating work to improve the emotional well-being of employees with the utmost concern following the disruption. A leader must act as a technology enabler, being well-versed in the relevant technology and acting as a catalyst in promoting the same among employees [11,37,38,51].

7. Contributions and Implications

The findings of this study are useful for practitioners, policymakers, and researchers. This study contributes to theory and practice in multiple ways:

- The literature on e-leadership is primarily related to managing virtual teams and remote workers. However, there is a dearth of studies on understanding the role of e-leadership and its critical success factors. The findings of this study help practitioners develop an e-leadership model at the workplace through which leaders can effectively transition to e-leaders.
- Several studies on e-leadership have reported on its relationship with communication, building trust, team management, and its role during the pandemic. These are very limited factors facilitating the success of e-leadership. This study identifies 21 critical success factors that influence the role of e-leadership in the context of IT companies for which employees work virtually. This study also justifies this through the fuzzy Delphi and AHP approaches. In the literature, limited studies have determined the significance of critical success factors using multi-criteria analysis that can help ensure a smooth transition from leadership to e-leadership. The phase-1 analysis using fuzzy Delphi finalizes the list of critical success factors that are relevant in the present scenario. With the use of AHP, the dominance of each of the critical success factors is determined. Sensitivity analysis is used to validate the framework.
- This study will facilitate the planning of effective e-leadership strategies for practitioners and decision-makers of virtual organizations. The identified critical success factors are in the context of IT companies in India. The same indicators can be employed in other sectors and other economies with appropriate modifications suggested by experts. Hence, this can be considered a unique contribution for industry practitioners to develop strong e-leadership to meet organizational objectives.

8. Conclusions, Limitations, and Future Scope for Research

8.1. Limitations and Scope for Future Research

The present study identifies critical success factors for e-leadership in the IT sector using an SLR and primary survey. However, the study has a few limitations. It may be noted that the sample space of this study targeted the IT sector. If a separate study is conducted considering another sector, the enlisted critical success factors for the transition from leadership to e-leadership may be subject to change. In this regard, it is suggested that additional studies target a separate group with a specific focus on the targeted sectors. Moreover, considering IT governance, which is an essential component for organizations seeking to improve their alignment maturity, could help derive some interesting insights. The present study does not examine the impact of IT governance, which can add to the future scope of the study. A potential direction for future research could be to examine the impact of CSFs on various elements such as team performance, productivity, employee motivation, and work engagement by considering some of the constructs as mediators and possible moderators. Considering the transition from workplace culture to remote work, the usual leadership may not be anachronous. Considering this, leaders should transform into e-leaders, and the identified CSFs can help ensure a smooth transition. Sectors including tourism, education, manufacturing, and hospitality were seriously affected by the COVID-19 pandemic, which posed numerous challenges and opportunities for them [52].

8.2. Conclusions

This study envisages contributing to the transition from leadership to e-leadership, which is the need of the hour, as many IT companies have been adopting remote work culture instead of workplace culture in view of the associated benefits. Our study contributes new insights to the context of e-leadership, identifying three types of critical success factor categories, including (a) 'Technology Management', (b) 'E-motivation and well-being', and (c) 'E-change management'. These categories encompass 21 critical success factors, among which 15 critical success factors are identified as relevant in the current context based

on a fuzzy Delphi analysis. The findings of the empirical analysis performed using the Fuzzy Analytical Hierarchy Process indicated 'E-motivation and well-being' as the most important category of critical success factors for e-leadership. 'E-motivation and well-being' encompasses certain CSFs, including communication, concern for financial well-being, employee engagement, building trust, self-leadership, mindfulness, and work appreciation.

Employee engagement is very important as it makes the team work together, be engaged in work, and learn from each other. In remote work, employees may be insecure about their jobs; e-leaders should motivate employees in terms of stability and financial well-being. E-leaders must establish a regular communication network to provide a platform where remote workers can share work-related issues and performance indicators and receive feedback. It is very difficult to obtain trust in a virtual work environment. Team members have not met each other face to face, which makes it challenging to gain trust and depend on each other. For e-leaders, it is difficult to establish a trusting relationship with their employees virtually. E-leaders must communicate and be concerned about their employees' well-being, which will build trust and improve the relationship. In this regard, it is imperative for e-leaders to train their employees to use technology effectively. In a virtual work environment, employees need to be mentored, as remote work triggers social isolation. A leader can mentor the employee to ensure continuous learning and development. E-leaders must support their employees in terms of resources, change management, and delivering their performance. A leader must forecast the change and use different techniques to understand the need for change. If the change is inevitable, it must be adapted to, and the leader should be the flagbearer of change. E-leaders must manage teams effectively by promoting communication, building trust, and sharing a concern for financial well-being. Another important factor is work appreciation; leaders must appreciate the work done by remote employees to boost morale and make them feel valued. E-leaders must train employees and provide them with work autonomy to avail flexible options for balancing their work and family life. Role clarity in a virtual work setting is important; e-leaders must redesign the key result areas (KRA) of employees to help them understand their work requirements. E-leaders must have high emotional intelligence to manage remote employees. This will help the employees to break isolation and improve their well-being. Organizations must adapt to new technology, and e-leaders must become technology enablers to introduce the latest technology to remote employees. Overall, the findings of this study help guide a variety of practitioners, primarily leaders of traditional, face-to-face teams, top management, and managers that transitioned into e-leaders due to the urgency created by the change and, in general, of organizations that transition from physical model to virtual mode ensure cost-effectiveness.

Author Contributions: J.A. conceptualized and supervised the study, collected and analyzed the data, and prepared and finalized the manuscript; H.P. analyzed the data and prepared and finalized the manuscript; R.P.S. supported the literature review and data collection. E.P.H. supported the literature review and the data collection. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Data Availability Statement: Data are available upon reasonable request.

Acknowledgments: The authors would like to thank the editors and all reviewers for their invaluable comments and advice. We also thank the research participants for their participation in the survey.

Conflicts of Interest: The authors declare no conflict of interest.

Appendix A

Authors thank the participant for accepting the invitation participate in this survey aiming to identify the Critical Success Factor (CSF) of e-leadership and to determine the hierarchy of all the indicators.

1. A total of 21 critical success factors (CSF) affecting the implementation of e-leadership are identified using literature review. We want your expertise to rate the relevance of each identified CSF.
2. Use the following scale to rate the relevance of the identified critical success factors.
3. Questionnaire to be filled in presented in the next page. Thank you for taking out your time to participate in this study.
4. Summary of our study outcomes will be shared with each of the participant. And the team ensures that no personal details such as your name, company name, and your locations are captured and stored. The study is purely intended to capture your perception.
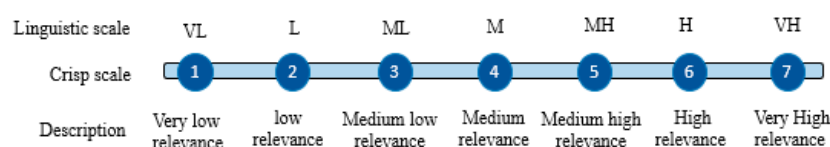
Figure A1. Seven-point linguistic scale to rate the relevance of identified critical success factors.

Appendix A.1. Questionnaire and Sample Response Sheet

		VL	L	ML	M	MH	H	VH
1	Technology enabler	☐	☐	☐	☐	☒	☐	☐
2	E-training	☐	☐	☐	☐	☐	☐	☒
3	leadership support	☐	☐	☐	☐	☐	☒	☐
4	knowledge sharing	☐	☐	☐	☒	☐	☐	☐
5	Managing change	☐	☐	☐	☐	☐	☒	☐
6	E-mentoring	☒	☐	☐	☐	☐	☒	☐
7	Team management	☐	☐	☐	☐	☒	☐	☐
8	Work autonomy	☐	☐	☐	☐	☒	☐	☐
9	Role clarity	☐	☐	☐	☐	☒	☐	☐
10	Clarity of organizational goals	☐	☐	☒	☐	☐	☐	☐
11	Feedback	☐	☒	☐	☐	☐	☐	☐
12	Concern for financial well-being	☐	☐	☐	☐	☐	☐	☒
13	Building trust	☐	☐	☐	☐	☐	☐	☒
14	Emotional stability	☒	☐	☐	☐	☐	☐	☐
15	Communication	☐	☐	☐	☐	☐	☐	☒
16	Employee engagement	☐	☐	☐	☐	☐	☐	☒
17	Self -leadership	☐	☐	☐	☐	☒	☐	☐
18	Work appreciation	☐	☐	☐	☐	☒	☐	☐
19	Mindfulness	☐	☐	☒	☐	☐	☐	☐
20	Psychological well-being	☐	☐	☐	☒	☐	☐	☐
21	Rewards and benefits	☐	☐	☒	☐	☐	☐	☐

Note: The responses shown in the sample questionnaire are ob-tained from one of the experts.

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