Emerging Role of E-leadership: A PLS-SEM Analysis

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Abstract Purpose: Globalization, Industry 4.0 and COVID 19 pandemic has led to a change in the business environment thereby inculcating a shift towards smart or remote mode of working. The application of technology has led to the concept of E-leadership. The purpose of this paper is to study the factors influencing the role of E-leaders and their impact on organization performance. The findings provide organizations to be future ready with technological advancement and help gain competitive market advantage**.**
Design/methodology/approach: Quantitative approach was used in this study. Data was gathered by a survey instrument and Partial Least Squares-Structural Equation Modeling (PLS-SEM) technique was used to investigate the model which was applied to 482 responses. The model explained 41.4 percent variation of major constructs in relation to organization performance with the implementation of E-leadership. **Findings:** Organization culture is the most influential factor followed by Collaboration and Digitalization towards the role of E-leaders. Mutual respect received the highest loadings among organization culture, common goals align with employee expectations among collaboration, facilitate processes that encourage employees to transition to technology roles among digitalization and develop a clear action plan for change initiatives among the E-leadership construct. The results reflect the role of E-leadership on organization performance. **Research limitations/ implications:** The model proposed in this study is not confined geographically and thus could be explored in different demographic settings. **Practical implications:** The study will guide organizations to identify the factors that strongly influence the role of E-leaders and as a consequence provide deep insights while formulating their strategy pertaining to the implementation of E-leadership.

Keywords:E-Leadership; Digitalization; Organization Culture; Collaboration; Organization Performance; PLS-SEM

Introduction

Technological advancement is leading to new work patterns within organizations. Companies are witnessing change in business processes (Smet et al., 2020)due toGlobalization, Volatility, Uncertainty & Ambiguity (VUCA), Industry 4.0 and the Covid 19 pandemic. Thisis driving the need for creative people to lead effectively towards productivity. Thus, the role of E-leaders is gaining importance whereby leaders are integrating electronic and traditional mode of communication within the organization. A leader transitioning to E-leader involves enhancement of skills and practices (Iriqat&Khalaf, 2018).

E-leadership (Avolio et al.,2001) is described as the co-existence of technology and leadership with emerging organizational practices. E-leaders operate and think differently i.e. follow a collaborative approach with a culture fostering organization performance (Oberer&Erkollar, 2018). The implementation of E-leadership requires technological advancement whereby E-leaders encourage (Cortellaza et al., 2019) bringing together geographically dispersed employees. With employees spread across locations, E-leaders have the opportunity to thrive by streamlining their communication strategies using technology. Studies by Oh and Chua (2018)emphasize E-Leaders as managers who encourage employees from various geographies and time zones to develop and enhance their skills and capabilities.

The importance of studying E-leadership gained popularity when the practices of E-leadership within organizations attained momentum(Lui et al., 2018); however as indicated by Van Wart et al., (2019); there has been limited progress in this field. Literature on E-leadership state limited significant development in this area due to lack of clarity on the role of leaders and their expected performance. Another noteworthy reason is limited study of factors which influence the role of E-leadership. Hence, the objective of this study is to identify these factors and their influence on the role of E-leaders; thereby enabling organizations to be digital ready.

Literature Review

The study of literature from secondary sources helped to identify the gaps prevalent in the existing research available on the topic. By mapping the gaps the factors influencing E-leadership were identified i.e. three independent variables as indicated below:

(1) Digitalization

Digitalization has led to a transformation in the functionality of organizations thus promoting a smart working environment (Verhoef et al., 2019). The role of leaders is playing a critical aspect in adopting appropriate technology and necessitating the way

towards digitalization. With digitalization, leaders in organizations are focusing on technologies, resources as well as solutions to ensure a productive environment (Kodama, 2020). Studies indicate literature on leadership has been examining the transformation bought about by digitalization in organizations (Cortellazzo, 2019). Thus, the role of E-leaders has emerged, whereby E-leaders communicate through technology (Avolio et al., 2014). The significance of examining the relationship between digitalization and leadership is gaining importance; thus there is a need for research in this area.

Researchers have argued that digital revolution has led to a shift towards digital mind-set whereby leaders are curious about digital technologies and keep themselves abreast with latest innovations (Saputra et al., 2021). Studies conclude that a leader with a digital mind-set encourages digital transformation and influences organization performance.

The following hypotheses have been formulated that will be further tested through the research:

H1: There is a significant positive relationship between digitalization and the development of the role of E-leadership in organizations.

(2) Organization Culture

The culture of an organization plays an important role in governing the sustainability of the company (Ivcevic et al.,2021). There are various definitions of organization culture, however one of the widely accepted definitions is by Edgar Schein who defines culture as common beliefs of a group of people as per their action and perception. Studies indicate culture to encourage a learning and growth oriented environment which is driven by leaders (Yue, et al.,2019).

Organization culture influences the role of leaders which is emerging to be virtual, digital or electronic (Torre &Sarti, 2020). This is enabling leaders to reach employees across the globe and to adopt new communication methods to disseminate the mission and vision of the organization (Schiuma, et al.,2019). Studies indicate organizations to have transformed their business on a digital path andleaders are adopting digital tools for better collaboration (Celik et al., 2023).

Brown et al.,(2021)in their research studied organization culture and concluded that it plays an important role in employee performance and well-being. An adaptive culture encourages leaders to adapt to an external environment that enables change in the organization. Similarly, a positive environment enables the workforce to respond effectively to a new condition thereby influencing organization performance.

The following hypotheses have been formulated that will be further tested through the research:

H2: There is a significant positive relationship between organization culture and the development of the role of E-leadership in organizations.

(3) Collaboration

Collaboration refers to integration ofideas in order to achieve shared goals (Bedwell, Fiore & Salas, 2014). Effective collaboration requires teamwork driven by leaders focusing on setting up of goals and development of team processes (Kozlowski &IIgen, 2006). Studies have been conducted on collaboration (Pagani and Pardo, 2017), however a deeper analysis is required to understand the transformation of collaboration in the digital age.

Scholars (Ajiferuke, 2021) suggest a new form of leadership defined as E-leaders for encouraging collaboration in organizations. E-leaders are well networked empowering employees to collaborate and communicate effectively (Kane et al., 2018). These leaders act as facilitators of collaboration by encouraging transparency – a necessary step in fostering organization performance (DiFranza, 2019). In their study on collaboration, Larjovuori, et al., (2018);highlighted on the challenges faced by non-verbal communication in virtual teams. Thus, it is importance to focus on the role of E-leaders in clearly communicating responsibilities to their team members spread across locations and working towards a shared goal.

The following hypotheses have been formulated that will be further tested through the research:

H3: There is a significant positive relationship between collaboration and the development of the role of E-leadership in organizations.

Conceptual Model

The hypotheses of the study were developed based on the review of previous research on E-leadership. The conceptual model of this study is depicted in **Figure 1** as E-leadership is the main contribution of this research paper. This paper determines the association between digitalization, organization culture, collaboration and E-leadership on organization performance. Hence, hypotheses as outlined in **Table 1**are developed on the bases of past studies as well as literature review. These hypotheses are formulated to analyse the relationship between E-leadership (as the mediator) and the three constructs; digitalization, organization culture and collaboration on dependent construct i.e. organization performance.

Figure 1. Conceptual model of E-leadership

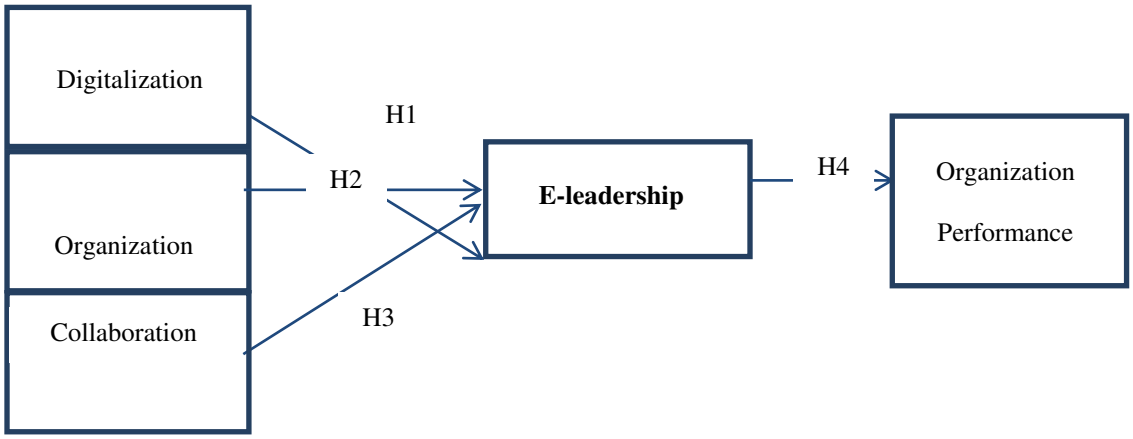


Table 1. Hypotheses

Hypotheses	Description
H1	There is a significant positive relationship between Digitalization and the development of the role of E-leadership in organizations
H2	There is a significant positive relationship between Organization Culture and the development of the role of E-leadership in organizations
H3	There is a significant positive relationship between Collaboration and the development of the role of E-leadership in organizations.
H4	There is a significant positive relationship between E-leadership and organization performance

Research Methodology

Survey data was collected from professionals associated with either the manufacturing or service industry across the globe. A wide range of variables related to E-leadership were studied and the technique of Structural Equation modeling (SEM) using Partial Least Squares (PLS) via ADANCO software was employed for data analysis and testing of hypothesis. PLS helps to understand the relationship within a model (Fornell and Bookstein, 1982) and to confirm hypothesized relationships at theoretical level are related empirically (Khalifa and Liu, 2003). Therefore, PLS is found to be effective for analyses of exploratory models like the model outlined in the research, where explanation of construct interrelationship is required (Ranganathan et al., 2004). The respondents were reached out via Linkedin, Whatsapp and direct active contacts or network of the researcher and the survey instrument i.e. questionnaire was easily made available by being uploaded on Google Forms.

The survey instrument usedin the study was developed after conducting a broad review of relevant literature. It also helped to identify gaps in the existing research available on the topic. By mapping the gaps the factors influencing E-leadership were identified i.e. digitalization, organization culture and collaboration. This also helped to identify sub-variables, constructing questions for each sub-variable and thereby building the survey instrument.

The anonymity of the respondents was ensured. The survey questions were close-ended and Likert scale was employed. The items on the scale were Strongly Disagree = 1, Disagree = 2, Neutral = 3, Agree = 4 and Strongly Agree = 5. A pretest was undertaken to identify any problems with the contents of the questionnaire.
The sample was drawn from professionals in the manufacturing or service industry with overall experience of 5+ years who are individual contributor or leaders with subordinates employed by organizations. The survey saw responses from 482 participants which were used for data analysis. The populationunder consideration is infinite, hence the necessary sample size as given by Aczel, Sounderpandian and Patille (2006) is $n= \underline{(z_{\alpha/2})^2\sigma^2}/ B^2$ where n is the necessary sample size and $z\alpha/2$standard normal random variate. With 95% confidence level, a standard deviation of 0.5 and a margin of error (confidence interval) of ±5%, the necessary sample size for infinite population is n=384.16. Thus, sample size of 482 is adequate for the research.

Profile of Respondents

The **Table 2** indicates profile of respondents of the online survey. A total of 1000 survey questionnaires were shared with participants across the globe, however 482 (48.2%) respondents participatedin the research. Out of this, male respondents were 74.7% and 25.3% were females. Although the number of responses was skewed towards male respondents, gender bias may not affect the findings of the research. In addition, the survey witnessed respondents from all age groups i.e. 18 to 30 years (0.4%); 30 to 45 years (32.8%); 45 to 60 years (65.6%); 60+ years (1.2%). As for years of work experience 34.9% were with 25+ years of experience followed by 21% with 10 to 15 years of experience. For education level, majority of respondents were postgraduates 44%; undergraduates 41% and doctorate 14.5%. The descriptive statistics showed that majority of the respondents were employed full time i.e. 97.9% followed by part-time with 1%, retired with 0.8% and seeking opportunities with 0.2%.

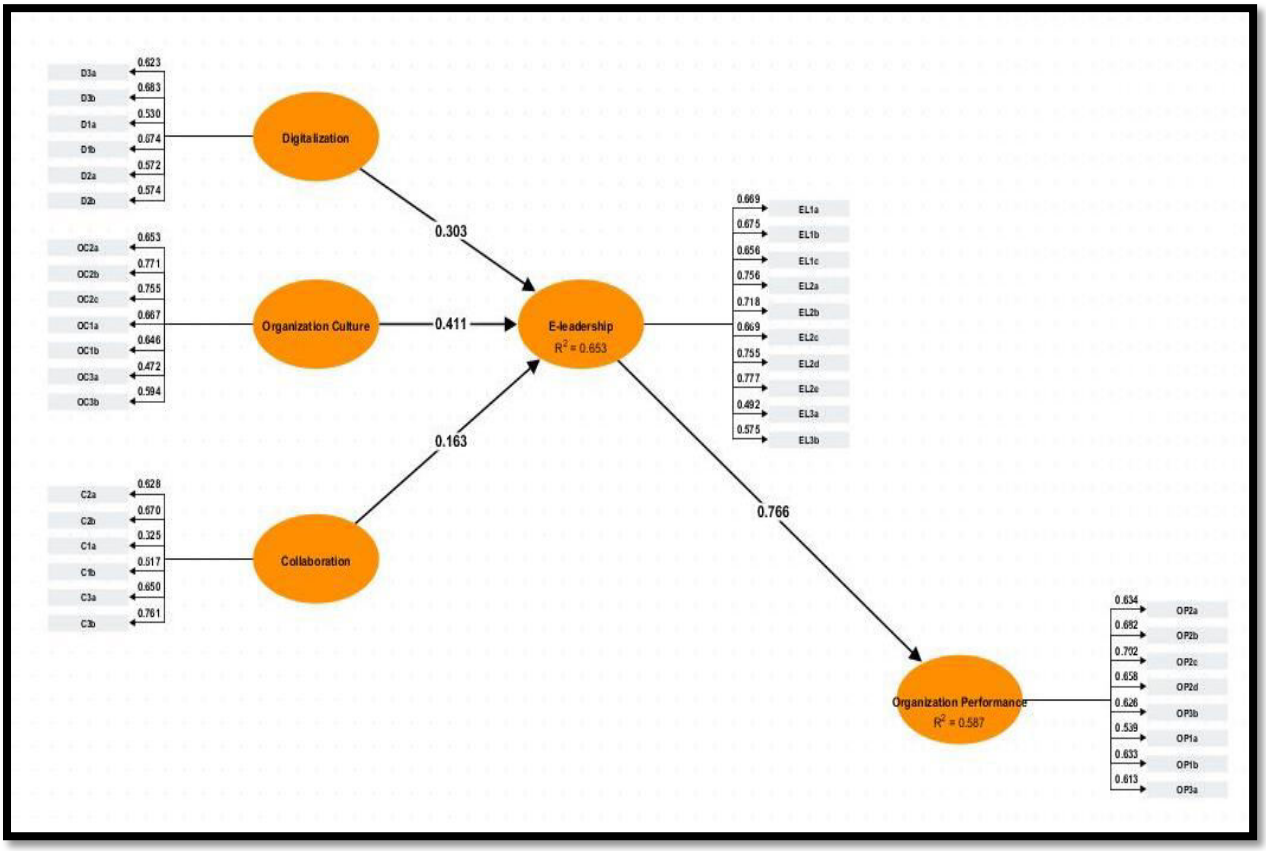
Table 2. Respondents Profile

Variables	Number (n)	Percentage (%)
Gender		
Male	360	74.7
Female	122	25.3
Age		
18 to 30 years	2	0.4
30 to 45 years	158	32.8
45 to 60 years	316	65.6
60+ years	6	1.2
Years of Work Experience		
Below 5 years	2	0.4
5 to 10 years	41	8.7
10 to 15 years	101	21.0
15 to 20 years	90	18.7
20 to 25 years	80	16.4
25+ years	168	34.9
Geography		
Canada	8	1.7
USA	88	18.3
South America	4	1.0
Europe	122	25.1
Africa's	37	7.7
Middle East	19	4.1
Asia Pacific	204	42.1
Education		
Undergraduate	198	41.1
Postgraduate	214	44.4
Doctorate	70	14.5
Employment Status		
Full-time	472	97.9
Part-time	5	1.0
Retired	1	0.2
Seeking opportunities	4	0.8

SEM using PLS technique via ADANCO

The relationship of the three independent constructs i.e. Digitalization, Organization Culture and Collaboration with E-leadership and the impact of E-leadership on the dependent construct i.e. Organization Performance is examined in **Figure 2**. The respective indicators (questions addressed to the respondents) along with their loadings to the constructs are also portrayed in **Figure 2.**

Figure 2. Depiction of Independent & Dependent Constructs (with their respective loadings) via ADANCO



Measurement Model

A software package for variance-based structural equation modeling, ADANCO 2.3.2 was used to investigate the research model as outlined in **Figure 2**and to test the hypotheses. This technique helps researchers to describe the relationships within a model (Fornell and Bookstein, 1982) and also simultaneously examine whether the hypothesized relationships at the theoretical level are empirically confirmed (Khalifa and Liu, 2003). Thus, the PLS-SEM technique was suitable for analysis and evaluation of the exploratory model of our research.

The measurement model comprises of two stages wherein the first stage comprises of validation of the model and the second stage is the structural model.

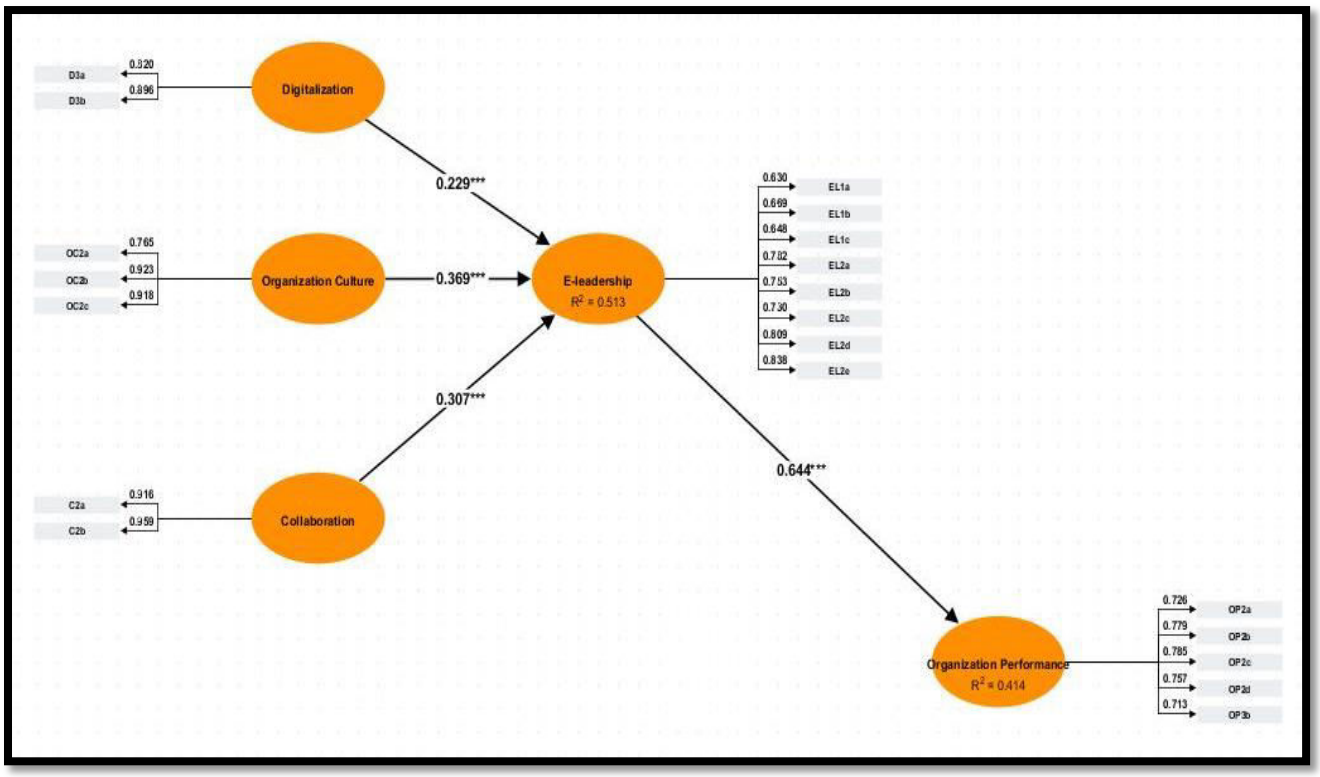
Measurement Model Validation

The first step in validation of the measurement model is to assess the reflective model (Nimako et al., 2014) which includes reliability of indicators (item loadings), internal consistency reliability, convergent validity and discriminant validity. It is also essential to measure the collinearity as well as consider the strength of the path coefficient with respect to the overall structural model.

a) Indicator Reliability (Item Loadings)

The loadings of the indicators were examined and only those greater than 0.6 were considered (Fornell and Larcker, 1981). Based on **Figure 2**, the loading score of indicators less than 0.6 were eliminated and thus the indicators became reliable for measurement of each construct within the model. The model was then run using Bootstrapping to 4,999 for results as depicted in **Figure 3**.

Figure 3. Depiction of Indicator Loadings above 0.6



b) Internal consistency reliability

One of the most common measures of internal consistency reliability as well as construct reliability is Cronbach Alpha. According to Cortina (1993); Nunnally& Bernstein (1994), Cronbach Alpha in the range of 0.65-0.80 are acceptable.

In**Table 3**, it is observed that the constructs were within the range or greater than the standard condition (0.65-0.80) with Collaboration (0.9355) followed by Organization Culture (0.9019), E-Leadership (0.9003), Organization Performance (0.8630) and Digitalization (0.8473). Hence, the constructs can be categorized as reliable and meeting the internal consistency criteria.

Table 3. Construct Reliability

Construct	Dijkstra-Henseler's rho (ρ_A)	Jöreskog's rho (ρ_c)	Cronbach's alpha(α)
E-leadership	0.9081	0.9034	0.9003
Digitalization	0.8520	0.8490	0.8473
Organization Culture	0.9122	0.9043	0.9019
Collaboration	0.9369	0.9359	0.9355
Organization Performance	0.8680	0.8670	0.8630

c) Convergent validity

Convergent validity describes the convergence of a construct from its specific indicators by describing the variance of the items (Hair et al., 2011; Sarstedt et al., 2014). It is evaluated by the Average Variance Extract (AVE) and the minimum justifiable value is 0.5 (Barclay et al., 1995). If the value is greater than 0.5, it implies that more than 50 percent of the items of the construct have been explained.

From**Table 4**, AVE values for each of the construct were greater than 0.5 i.e. E-leadership (0.5414), Digitalization (0.7379), Organization Culture (0.7603), Collaboration (0.8797) and Organization Performance (0.5662). Thus, convergent validity has been established.

Table 4. Convergent Validity

Construct	Average variance extracted (AVE)
E-leadership	0.5414
Digitalization	0.7379
Organization Culture	0.7603
Collaboration	0.8797
Organization Performance	0.5662

d) Discriminant validity

Discriminant validity is a measure which indicates the extent to which different constructs in the model vary from each other. It is generally assessed by the correlation existing between the constructs which potentially overlap. Discriminant validity can be evaluated by the criteria of Fornell-Larcker as well as cross loadings (Jamil, 2012; Hair et al., 2013; Sarstedt et al., 2014). As per Fornell-Larcker elements in the diagonal need to be greater than off-diagonal elements to meet the criteria of discriminant validity.

From the results of **Table 5**, the elements in the diagonal were greater than the off-diagonal elements. Thus, the model met the criterion of discriminant validity.

Table 5. Discriminant Validity (Fornell-Larcker Criterion)

Construct	E-leadership	Digitalization	Organization Culture	Collaboration	Organization Performance
E-leadership	**0.5414**				
Digitalization	0.2573	**0.7379**			
Organization Culture	0.3774	0.2157	**0.7603**		
Collaboration	0.3065	0.1213	0.2055	**0.8797**	
Organization Performance	0.4143	0.2479	0.3051	0.2594	**0.5662**
Squared correlations; AVE in the diagonal.					

Structural Model

The use of coefficient of determination (R^2) is taken into account for explaining the construct with respect to all the constructs in the research. The minimum threshold of R2 is 0.2 (Hernandez-Perlines and Cisneros, 2017) and the construct is relevant as well as noteworthy if the value of R2 exceeds 0.2.

From**Table 6**, the value of R^2 for the dependent construct i.e. Organization Performance is 0.414, thus reflecting that 41.4% of the variance in the latent variables is explained and has moderate explanatory power by the contributing factors included as antecedents in this model.

Table 6. Coefficient

Construct	Coefficient of determination (R^2)	Adjusted R^2
Organization Performance	0.4143	0.4131

The final phase of assessing the structural model is to observe the strength of path coefficients. The values of the path coefficient usually range from +1 to -1 (Sarstedt et al., 2014), where a value which is nearer to +1 represents a strong positive relationship and a value which is nearer to -1 represents a strong negative relationship. The bootstrapping procedure results (482 cases, 4999 samples) as depicted in Table 7 indicate that the four structural relationships were significant (p ≤0.05).

Table 7. Bootstrap direct effects inference

		Standard bootstrap results					Percentile bootstrap quantiles				
Effect	Orig. coeff.	Mean value	Std. error	t-value	p-value (2-sided)	p-value (1-sided)	0.5%	2.5%	97.5%	99.5%	Supp?
El->OP	0.6436	0.6376	0.0619	10.4011	0.0000	0.0000	0.4893	0.5197	0.7561	0.7823	Yes
D->EL	0.2291	0.2279	0.0503	4.5595	0.0000	0.0000	0.0963	0.1297	0.3270	0.3580	Yes
OC->EL	0.3690	0.3673	0.0516	7.1482	0.0000	0.0000	0.2294	0.2652	0.4675	0.4926	Yes
C->EL	0.3066	0.3039	0.0458	6.6953	0.0000	0.0000	0.1869	0.2142	0.3958	0.4241	Yes

In

Table 8, the path coefficient of digitalization, organization culture and collaboration to E-leadership and E-leadership to organization performance are depicted. It indicated positive as well as significant relationship of all the independent constructs to E-leadership and the impact of E-leadership on organization performance. It also represented that all the hypotheses are valid and authenticated by data. It is observed that organization culture is the most influential construct to E-leadership which in turn influences organization performance.

Table 8. Path Coefficient

Independent variable	Dependent variable	
	E-leadership	Organization Performance
E-leadership		0.6436
Digitalization	0.2291	
Organization Culture	0.3690	
Collaboration	0.3066	

Research Findings

Overall findings of the research

E-Leadership is strongly influenced by organization culture followed by collaboration and digitalization. The coefficient of determination (R2) of 41.4 percent variation is explained by the model. The research findings align with the findings of similar past research undertaken by Müller, S.D. et al., (2019).

From the observations in **Figure 3**, Organization Culture (0.369*) is playing a pivotal role for leaders in the digital age. With increasing flexibility in work arrangements and a surge of remote work, E-leaders can build trust and effectively manage the performance of remote professionals through empathy towards employees' interests, mutual respect and fair processes while allocating resources for specialized roles. The findings are similar to researchers such as Alonazi (2021) who demonstrated the importance of organization culture in driving the role of leaders in organizations.

By observing the indicators of the dependent construct the element which highly affected organization performance was "OP2c" which accounted 0.785, followed by "OP2b" (0.779). This represented organization performance to be enhanced by E-Leaders leveraging digital technologies to provide better customer experience and by establishing digital systems for better communication of customer insights.

Summary of research findings

H1: The findings generated from the research aligned to accepting Hypothesis 1, "There is a significant positive correlation between Digitalization and the development of the role of E-leadership in organizations".

The result indicated digitalization as the least significant construct influencing E-leadership with path coefficient (0.229). The research findings were similar to previous studies (Valeria, E.G., et al., 2020; VinitParida, et al., 2019; Schwarzmüller, et al., 2018). Within Digitalization, "D3b" was the most impactful factor influencing E-leadership

with 0.896. The other digitalization factor was followed by "D3a" (0.820). The research findings prove digitalization to have a significant impact on E-leadership and it is also leading to new work mechanisms within the organization.

H2: The findings generated from the research aligned to accepting Hypothesis 2, "There is a significant positive correlation between Organization Culture and the development of the role of E-Leadership in organizations".
The result indicated organization culture as the most significant construct influencing E-leadership with path coefficient of 0.369. Past studies (Cortellazzo, Bruni, Zampieri, 2019) found that with increasing flexibility in work arrangements and a surge of remote work, the culture of an organization in the digital age is leading to a change in the role of leaders.

Within Organization Culture, "OC2b" was the most impactful factor influencing E-leadership, with 0.923. This indicates that E-leaders can build trust and effectively manage the performance of remote professionals through empathy towards employees' interests, mutual respect and follow fair processes while allocating resources for specialized roles. The other Organization Culture factors that influenced E-leadership were followed by "OC2c" (0.918) and "OC2a" (0.765). Organizations motivate employees to be creative by rewarding them. These findings align with the studies undertaken by Solomon and Steyn (2017).

This construct is connected to E-leadership, when the culture of the organization encourages leaders to lead through electronic medium. The more the culture of the organization is digitalized and well connected, the greater are its chances of promoting E-leadership (Van Wart et al., 2019).
Thus, E-leadership is influenced by organization culture which plays a pivotal role in organization performance.

H3: The findings generated from research aligned to accepting Hypothesis 3, "There is a significant positive correlation between Collaboration and development of E-leadership".

The result indicated collaboration as strongly influencing E-leadership with path coefficient of 0.307. Although previous studies by Bernstein and Turban (2018) found that there was no significant relationship between collaboration and E-leadership, researchers like Kramer &Pfitzer (2016)found collaboration to have a positive significant effect on leadership of organizations.

Within collaboration, the results portrayed "C2b" as strongly influencing E-leadership, with 0.959 as the indicator loading. The other aspects of collaboration that influenced E-leadership were followed by "C2a" (0.916). This indicated that for accelerating collaboration, E-leaders encourage their employees to work towards a common goal and provide feedback to ensure the goals align with employee expectations (Darics, 2020).
Thus, collaboration plays an important aspect in influencing the role of leadership within organizations.

H4: The findings generated from the research aligned to accepting Hypothesis 4, "There is a significant positive correlation between E-leadership and organization performance".

The result indicated that the construct of E-leadership is influencing organization performance with path coefficient (0.644). The research findings were similar to previous studies (Valeria, E. G., et al., 2020), where leaders played a significant positive role in influencing the performance of organization. E-leaders communicating the purpose of change and developing a clear action plan help to drive strategic initiative for organizational growth (Ahuja et al., 2023). Digital technologies encouraged by E-leaders enhance the capabilities of organizations for engaging with customers and to effectively communicate customer insights. By investing in employee recognition and rewards for customer focused behavior, E-leaders can improve organization performance and effectiveness.

Theoretical Contributions & Managerial Implications of the Study

Digital transformation is important for organizations to sustain in the era of technological advancement. Thus, it is essential for companies to develop a strategy focusing on their leadership capability keeping in view factors like digitalization, organization culture and collaboration. The main contribution of this research is to study the factors influencing the role of E-leaders and their impact on organization performance. Based on the findings it is indicated that organization culture, followed by collaboration and digitalization influence the role of E-leaders improving organization performance. E-leaders encouraging training of employees on digital technologies enhances customer focused skills, leading to effective customer insights and better customer experience thereby enhancing organization performance.

Therefore, organizations should focus on enhancing the role of their leaders with emphasis on an environment fostering digital competencies.

Limitations

The study like any other research had its own set of limitations. First, it was not confined geographically and hence different nations and continents are at varied stages of implementation of technology for leadership practices. Thus, the results of the study are quiet generalized. Secondly, the research was based on primary data and there is a scope for using mixed method to generate further insights on the topic of E-leadership.

Suggestions for future research

The study found organization culture to have the strongest influence on E-leadership as comparedto collaboration and digitalization. This finding is worthy of further research and investigation.

Future research could also focus on benchmarking organizations that follow best practices towards E-leadership in order to provide guidance for adoption of digital transformation.

Conclusion

The study investigated the emerging role of E-leadership on organization performance and evaluated the validity of a proposed model.

The results confirm factors like digitalization, organization culture and collaboration play a crucial impact on the emerging role of E-leadership. Some of the influencing factors like organization culture that emerged from this research hadnot been studied in previous studies.

Replication and extension of the study can occur in other contexts so that organizations at varied implementation stages of E-leadership can be better studied and reviewed. Thus, enabling effective management of leadership strategies and practices. The results from the research undertaken will prepare senior management of organizations who are decision makers to plan and transition their way towards E-leadership. This will enable organizations to be future ready with technological advancement and thereby gain competitive market advantage.

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