


Research

## Impact of E-leadership on organizational citizenship behaviour of faculty members in higher education: information and communication technology as a mediator

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### Abstract

Several leadership studies have linked e-leadership behaviours to individual, team, and organizational outcomes, but the magnitude of the link across settings and levels of analysis is still unclear. This association may be affected by various causes and mechanisms. Therefore, additional research is needed to determine how e-leadership behaviours are more effective. This study explored how e-leadership affects faculty members' organizational citizenship behaviour (OCB). Information and communication technology (ICT) was proposed as a developmental mechanism to mediate the link between e-leadership and OCB. This study used quantitative methods. Researchers obtain data using basic random sampling. Google Forms were used to distribute the questionnaires. The proposed model was evaluated with 355 respondents from 11 Palestinian universities. This study employed the structural equation model partial least squares (SEM-PLS) technique utilizing SmartPLS 4 software. This study used validity, reliability, and hypothesis tests. This study has one second-order construct and all reflective variables. Thus, the three latent variables affect the indicators. The results showed that e-leadership is linked to high faculty OCB and that ICT usage mediates this relationship. Additionally, this study examined the theoretical and practical consequences, limitations, and future research areas and suggestions.

**Keywords** E-leadership · Information and communication technology (ICT) · Organizational citizenship behaviour (OCB) · Higher education sector

## 1 Introduction

The COVID-19 pandemic has had a substantial impact on each facet of life; however, its effects on education have been especially obvious [1, 2]. Due to the lockdown caused by the pandemic, higher education institutes around the world were forced to quickly adapt to the crisis by switching from traditional face-to-face classes to online platforms [3, 4]. This swift shift to different education approaches has caused serious challenges for both students and lecturers [5]. Traditional higher education techniques have changed significantly in recent decades. Most education took place in a classroom, while universities started using even a little ICT [6]. However, as a result of the pandemic, universities worldwide have been compelled to adopt distance learning methodologies, which encompass the utilization of learning management systems and online platforms [2]. This change was observed at all education levels, which shows the necessity of e-readiness in terms of ICT infrastructure and eligible lecturers to maintain consistently high-quality education [7–9].

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Undoubtedly, the pandemic has made it difficult for lecturers to change, as the sudden switch to online education has given them more issues to address [7, 10]. For instance, amidst the transitions caused by the COVID-19 pandemic, faculty members found themselves not only fulfilling their stated responsibilities but also dedicating extra effort and time to preparing for or acquiring new competences to cope with distance learning requirements, which could negatively affect their work-life balance [11–13]. The prevailing uncertainty and anxiety among students and faculty members may significantly contribute to the deterioration of their mental health Batool et al. [14]. This decline in mental well-being, as observed by Abdul Rahman et al. [15], could subsequently hinder their academic performance. The extensive integration of technology in higher education institutions during the COVID-19 pandemic has been well studied, highlighting the critical role of technology adoption [16, 17]. Many lecturers were unprepared for the shift to online education, despite their best efforts to maintain continuity in the classroom [7, 18]. This finding stresses the importance of having enough trained academic staff, as they have a substantial impact on all educational processes, the quality of research, student achievement, the image of academic institutions, and the overall quality of academic programs [8]. According to Torlak Kuzey [19], the development and integration of distance learning tools require constant improvements and adaptability, as lecturers must constantly improve to stay current and skilled. Unfortunately, as found by Nugroho and Hakim [5] based on empirical data from direct observation and interviews with a group of university lecturers, many lecturers are unwilling to perform tasks outside their roles, express dissatisfaction with their duties, and seek incentives that may negatively affect their academic performance.

In response to the multifaceted challenges presented by the COVID-19 pandemic, universities have exhibited a remarkable propensity for adopting ICT in their operational frameworks, for instance, administrative, research, community services, and teaching processes [20]. This highlights the significant shift in leadership approaches during times of technology and virtual work, as e-leaders can guide and support faculty members in performing during the transition to distance learning [21–23]. Furthermore, e-leaders foster trust within followers during online work, facilitate efficient communication among followers, and ensure team cohesion [22]. This finding indicates that e-leadership behaviours, which are exerted by academic leaders, help them foster trust, promote communication, and support virtual work, which in turn leads faculty members to better use ICT and might increase job satisfaction and thus the performance of lecturers [24]. This underscores the imperative for e-leaders to effectively adapt their leadership strategies and skills to successfully navigate and lead amidst this transformative change.

In brief, the importance of e-leadership during digital transformation and how it copes with these challenges still need to be studied. The use of e-leadership for academic administration is not clear in the current literature [1]. Therefore, this study aims to clarify how the e-leadership and OCB of lecturers are linked under exceptional conditions faced by administrators and faculty members in Palestinian higher education institutions.

## 2 Literature review

### 2.1 E-leadership

In the digital age, the concept of leadership has been significantly affected by dramatic changes in every aspect of life, especially the vast changes in technology. Thus, this change has highlighted the importance of establishing e-leadership. The term e-leadership was first used by Avolio et al. [21] to describe leadership in the era of technology; this idea has significant theoretical and practical contributions for the leadership field as a whole. Avolio et al. [25] were among the earliest scholars to study the concept of e-leadership. They argue that while the traditional leadership concept has received scholars' attention due to its importance, a new approach to leadership is needed to address the unique challenges and opportunities of the modern digital world. There are several explanations and definitions for the term "E-leadership"; however, scholars have attempted to provide a more precise definition of the term. Darics [24] mentioned that leaders in digital communication need to acquire both traditional leadership skills and effective communication skills while working in virtual sittings. In essence, the ongoing evaluation and enhancement of e-leadership principles are not merely about technological adeptness, but about fostering a profound cultural shift towards adaptability, collaboration, and visionary leadership in the digital era.

Today's organizations are characterized by their growing complexity and are driven by the extensive use of technologies in their operations, which has brought attention to the necessity of conducting research to gain a better understanding of the e-leadership concept. E-leadership is the application of technology to shape the behavior and attitudes of individuals, with the aim of attaining positive outcomes [26]. According to Roman et al. [27], the concept of e-leadership

differs from more conventional concepts about leadership in that it centres on the use of technology with the purpose of influencing people's behaviours and attitudes through improving their awareness, emotions, and performance in the workplace. To conceptualize the concept of e-leadership, Van Wart et al. [28] conducted a comprehensive case study involving an intensive review of the relevant research. As explained in Table 1, the researchers established a model for e-leadership called the six e-competencies model (SEC). Table 1 provides an explanation of the six competencies included in this (SEC) model.

In this age of rapid technological advancement, higher education institutions increasingly emphasize the significance of e-leadership concepts for enhancing educational outcomes, particularly learning methods and thus student achievement. Prior research has reported a positive impact of e-leadership on educational outcomes in a higher education context [2, 29, 30]. For instance, Garcia [31] conducted a study on the impact of e-leadership on the effectiveness of distance learning, recognizing its vital role in shaping the environment of higher education institutions. Thus, universities can establish an energetic atmosphere by fostering e-leadership behaviours, which in turn will be positively reflected in both students and faculty members. De Freitas Routledge [32] established the e-leadership and soft-skills educational games design model (ELESS) to highlight the importance of incorporating e-leadership skills into educational games for the purpose of fostering leadership development. In summary, the adaptation of the e-leadership approach within higher education institutions has not only empowered institutions to cope with complex circumstances but also contributed to positive change, which in turn affected the experiences and achievements of both faculty members and overall academic excellence.

In the last few years, especially after the COVID-19 pandemic, e-leadership has become more important than ever [10, 33]. This is because of the importance of using technology to drive organizational performance, which makes the concept of e-leadership a mandatory marking for enhancing the connection between leaders and their followers [34]. The impact of e-leadership is not only for influencing people to perform their tasks given in their job descriptions but also for encouraging them to work in teams, especially in distance work, since the e-leader would be more effective in using a wide range of strategies in their communication [24].

## 2.2 Organizational citizenship behaviour (OCB)

In the last few decades, due to its importance, OCB has been a topic of extensive work. Organ [35] established the bath for the OCB concept, considering it a voluntary action that improves the productivity of individuals in organizational settings. Podsakoff et al. [36] highlighted the importance of OCB in boosting organizational effectiveness. They emphasize the necessity of distinguishing OCB from in-role performance and focusing on the extra behaviours represented by OCB. Scholars have focused on the interpretation of OCB, which results in several definitions. Organ [37] conceptualized OCB as actions in which employees perform voluntarily to benefit their organization, which allows them to positively affect the workplace culture without being formally recognized or rewarded.

Leaders in any organization would do well to educate themselves on the factors that shape OCB. Previous studies have consistently shown that transformational leadership behaviors significantly influence employee OCB. These behaviours include idealized influence, inspirational motivation, intellectual stimulation and individualized consideration. This highlights the pivotal role of transformational leadership in shaping employee outcomes [38–41]. The likelihood of observing OCB among workers is boosted by transformational leaders being able to inspire and motivate their subordinates [39, 42]. Furthermore, the link between transformational leadership and followers' outcomes, such as OCB and

**Table 1** Summary of the six-e-competencies model (SEC)

E-competencies	Description
E-communication	E-leaders effectively communicate with followers through electronic means, such as email, instant messaging, video conference
E-social	E-leaders manage their followers while virtual sittings, especially when operate with individuals from different culture background and different time
E-Team	E-leaders are able to form and effectively manage virtual teams that insure success, even with the absence of physical contact
E-change	E-leaders effectively ensuring that their organizations are swiftly and constantly adapt to the change in technology
E-tech	E-leaders competently utilize tools and smart technology to communicate, coordinate, and facilitate decision-making
E-Trust	E-leaders are able to develop and maintain trust with and among team members, in spite of distance separation

employee performance, was found to be mediated by leader-member exchange (LMX) [43, 44]. This finding suggested that leader–follower friendships can affect OCB. Felfe Heinitz [45] According to Karam Kwantes [46], people who live in a collectivist society have greater OCB than people who do not. Another important forerunner is leader-member exchange (LMX).

Undoubtedly, the profound effects of OCB, which influence both individuals and organizations, underscore its critical significance in navigating the complexities of contemporary contexts. Individuals who participate in OCB tend to exhibit higher levels of positive individual behaviour, such as organizational commitment and job satisfaction, when they are in an organizational setting [47]. Additionally, OCB has been identified as a strong incentive for decreasing individual misconduct in the workplace. When employees adequately engage in OCB initiatives, they are more likely to deter misconduct such as cyber-loafing, turnover intentions and selfishness [48, 49]. Consequently, OCB plays a vital role during times of crisis, such as during the last COVID-19 pandemic. The literature indicates that individuals' happiness and mental health improve when they practice a high level of OCB while dealing with pandemic consequences. This highlights the importance of OCB during crises [9]. Khalid et al. [7], who studied lecturers' OCB during the pandemic, reported that the ability of faculty members to effectively adapt and respond in challenging situations emphasized the importance of OCB for educational institutions in challenging situations.

### 2.3 Information and communication technology (ICT)

ICT incorporates a wide range of platforms and tools that enable people to exchange their ideas and thoughts and to create, convey, distribute, and manage their information. Furthermore, ICT includes media and software tools that facilitate the activities of obtaining, altering, storing, and distributing data [50, 51]. In our age, electronic devices such as computers, the internet, broadcasting systems, and telephones are widespread in every society [6]. To effectively obtain or exchange information from a distance, ICT includes employing several digital technologies, networks, and communication techniques [52]. The domain of ICT relates to the adoption of electronic tools to transmit and receive information across a wide range of technology means [50].

### 2.4 E-Leadership and ICT in higher education in Palestine

In the context of Palestine, ICT has become an essential and necessary part of educational settings, as the adoption of distance learning methods during and after the COVID-19 pandemic has notably increased [53]. A study conducted by Ayyash et al. [54] assessed the level of adoption of ICT by Palestinian higher education institutions and found that the incorporation of ICT within Palestinian institutions has significantly increased over time. However, the adoption of ICT in higher education sectors faces many internal and external issues. With regard to internal issues, one of the most influential refers to the poor infrastructure of IT, limited financial resources, and potentially inexperienced support personnel compared to other countries that used to integrate ICT into teaching methods too early. Although external issues impact the experiences of Palestinian people, including students and academic staff, these issues also constitute weak governmental and nongovernmental investments in ICT infrastructure [55]. Furthermore, there is a lack of policy frameworks that encourage the integration of ICT in higher education. For that reason, Masalmh et al. [55] commented that reaching an acceptable level of ICT adaptation in higher education institutions in Palestine necessitates overcoming these obstacles.

## 3 Theoretical underpinning and research hypotheses

### 3.1 E-leadership and OCB

The current literature on leadership indicates that e-leadership is significantly associated with organizational commitment among faculty members within the educational sector [34]. More specifically, Khalid et al. [7] identified several key behavioural indicators that affect OCB. These include faculty members' commitment to their responsibilities in educational settings, supportive behaviours towards their students, adoption of modern teaching methods, use of useful resources, and establishment of effective communication skills. These behaviours are strongly associated with the six competencies of e-leadership [22, 27]. A study carried out in the higher education context by Maheshwari et al. [56] examined the impact of e-leadership on employees' outcomes, especially well-being, engagement, and OCB. The study emphasized the importance of e-leadership as an appropriate leadership style that can shape the outcomes of employees

in distance work settings. For example, in the context of remote work settings, through e-communication skills, e-leaders can facilitate clear and effective communication and coordination among their followers to avoid the risk of miscommunication [27]. Hence, Cortellazzo et al. [57] highlighted that to encourage employees to share their ideas, show a strong sense of commitment, and participate in decision-making processes, e-leaders must adopt and adapt appropriate communication strategies to cope with various digital tools and potential cultural differences and diverse contextual rationales. E-leaders who excel in virtual communication techniques can enhance employee autonomy and decrease the necessity for direct supervision [57]. This can establish a culture of accountability and trust, which are essential for boosting OCB in digital settings.

Furthermore, through e-team competency, e-leaders can effectively affect the dynamics of virtual teams. Chaudhary et al. [30] found that leaders can encourage employees to explore and implement innovative solutions using their team-building skills, which in turn creates a sense of unity and shared goals and fosters collaboration, cohesion and synergy among team members. With regard to e-change, e-leaders tend to employ an effective approach to change by inspiring their teams' members to develop their competences to cope with technological advancements. Leaders in the virtual context tend to support change stages by investing in employee development to empower them to cope with the new social order of remote work [58]. Regarding e-tech, e-leaders professionally use digital platforms and tools. In addition, they tend to empower their followers to contribute to organizational productivity [59]. Furthermore, for e-trust, Verma [60] emphasize the importance of establishing strong informal communication in virtual settings to build trust and familiarity between leaders and their followers. Thus, e-leaders can enhance their followers' morale, organizational commitment and job satisfaction, which in turn contribute to obtaining higher levels of OCB.

Nevertheless, in the literature pertaining to different leadership styles and the empirical observations of lecturers' OCBs amidst the COVID-19 pandemic [13, 61, 62], it is justifiable to assume an association between e-leadership and the OCBs exhibited by lecturers within the context of higher education institutions. E-leadership is not only about how leaders use ICTs but also involves the integration of technology and the leadership skills proposed in the traditional leadership style, which may be highly suitable for facilitating and possibly augmenting the OCBs demonstrated by lecturers in these demanding circumstances. As e-leaders interact with their followers by employing digital communication to offer direction, resources, and assistance, instructors might exhibit higher levels of OCBs that enhance the overall achievement of the university. This implies that the utilization of e-leadership practices by universities during the pandemic is likely to have a favourable influence on lecturers' OCBs, resulting in enhanced dedication, adaptability, and supportiveness in their university positions. Therefore, we propose the following hypothesis:

**H1** E-leadership significantly and positively affects OCB.

### **3.2 The link between E-leadership and ICT**

ICT plays a pivotal and indispensable role in the functioning of contemporary enterprises, encompassing many aspects, such as e-leadership and employee behaviour [63]. Furthermore, the adoption of digital tools and platforms is crucial for any organization [1]. With regard to e-leadership, Okundaye et al. [64] suggested that the involvement of ICT in leadership practices significantly affects operational processes and the achievement of organizational goals. Similarly, Contreras et al. [1] mentioned that the integration of ICT into leadership practices, sometimes referred to as e-leadership, plays a significant role in contemporary organizations. For effective team management, digital settings require providing guidance, information sharing, and conflict resolution and enhancing cooperation among members. E-leadership plays an important role in incorporating ICT into organizations by providing effective supervision, communication, and decision-making and enhancing collaboration among members during virtual work. Understanding how leaders are able to cope with ICTs would be more effective at leading their organizations to higher levels of performance and effectiveness [64]. Thus, we propose the following hypothesis:

**H2** E-leadership significantly and positively affects ICT.

### **3.3 The link between e-leadership and OCB through ICT.**

The literature on both leadership and management has separately examined the links between e-leadership, ICT usage, and OCB. Certain theories may theoretically constitute a foundation for the associations among the three constructs. Social exchange theory notes that social interactions are mostly built upon the reciprocity base [65]. This means that

leaders who effectively utilize ICT to improve communication and collaboration with their followers can foster positive social dynamics, motivating employees to engage in desired behaviors that lead followers to express appreciation toward their leaders. Moreover, task-technology fit theory, proposed by Goodhue Thompson [66], highlights the match between the use of technology and task performance. Thus, leaders who employ technology can effectively enhance organizational operation effectiveness. Empirically, Wolor et al. [67] suggested that e-leadership provides a comprehensive understanding of online collaboration platforms for professional purposes. Moreover, Sunarsi et al. [34] highlighted the significance of ICT utilization in attaining organizational goals through enhancing the performance of individuals. Furthermore, as stated by Khalid et al. [7], faculty members employ diverse ICTs to enhance the learning experiences of their students. Accordingly, the utilization of technology provides advantages for both online educators and students. The justification for the integration of ICT, e-leadership, and OCB in the educational context is supported. Thus, we propose the following hypothesis:

H3 ICT usage significantly and positively affects OCB.

H4 ICT usage significantly and positively mediates the link between E-leadership and OCB.

### 3.4 Conceptual framework

Figure 1 shows the conceptual framework of the study, which was derived from the aforementioned theoretical foundation.

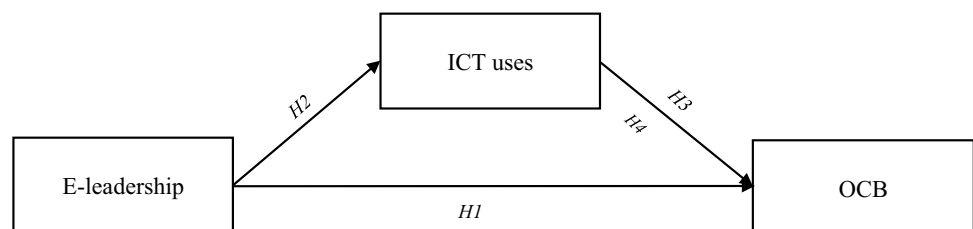
## 4 Research method

A research study was conducted employing a descriptive and cross-sectional methodology. This study utilized a self-administered cross-sectional survey to gather data from participants. To obtain the necessary data for this study, a questionnaire survey method was used to obtain responses from participants. The questionnaire pertains to faculty members' perspectives on (i) the e-leadership behaviors of their department heads or deans, (ii) their OCB, and (iii) their utilization of ICT in the context of distance learning during the COVID-19 pandemic. First, e-leadership was constructed based on the six e-competencies model (SEC) developed by Van Wart et al. [28]. This model encompassed six dimensions with 18 items, three items for each component. Second, for measuring faculty members' OCB, a set of 13 items was adapted from Khalid et al. [68]. The measurement was modified based on the instruments provided by DiPaola Hoy [69], MacKenzie et al. [70], and Burns DiPaola [71]. Finally, the measurement of perceived ICT competences was adopted from Wang et al. [72], and the questionnaire comprised 17 items evaluating computer technology capabilities and strategies.

The three factors in the current study were assessed using a scale that was adopted and modified from previously existing scales and validated in several previous empirical studies. The survey items were assessed using interval, nominal, and ratio scales. The survey items were assessed using an interval scale, specifically a five-point Likert scale. A pilot study was performed in the final step to assess the reliability and validity of the items for each variable. During the pilot study, researchers also considered the ethical and cultural considerations that emerged throughout its implementation. Subsequent to the pilot study, revisions were made to the questionnaire.

The collection of data on full-time faculty members employed in higher education institutions in Palestine was conducted using an online survey approach assisted by Google Forms. A random selection technique was employed to construct a database consisting of 500 Palestinian lecturers employed in higher education institutions. To ascertain the representativeness of the sample in relation to the broader academic population, a random selection methodology was

Fig. 1 Conceptual framework





used because the universities that were chosen exhibited similarities in terms of their characteristics and functioning. et al.-Istiqlal University, the military and security instructors were invited to participate as full-time instructors. A total of 500 survey link emails were distributed using the Outlook email platform. The data indicate that 71% of the forms that were distributed were returned. The data were collected between August and September 2023. Following the initial data cleaning process, 355 questionnaire responses were retained. The data analysis was conducted using SPSS version 28.0 and Smart PLS version 4.0.

## 4.1 Data analysis and results

The data analysis for this study was conducted in two stages following the collection of the minimum sample size. The initial data analysis, data pre-processing, and descriptive demographic analysis were conducted using SPSS (version 28). Hair et al. [73] recommended using the partial least squares SEM-PLS as an alternative to covariance based SEM, due to many reasons, such as, its ability to deliver latent variable scores, deal with small sample size, estimate the complex framework with different variables, and evaluating both reflective and formative models. Subsequently, Smart PLS 4 was employed in this study to evaluate the structural model and verify the hypotheses.

### 4.1.1 Preliminary data analysis

To maintain data accuracy, after the data were entered into SPSS, the researcher identified 22 items as outliers among the 355 respondents in the present study. After removing both the univariate and multivariate outliers, a total of 333 patients were deemed suitable for analysis in this study. The test indicated that the variables exhibited normality, therefore obviating the necessity for changes such as data transformation. Regarding linearity, scatterplots were analysed, revealing a distinct linear pattern. Hence, the absence of nonlinearity issues was not identified in this investigation.

### 4.1.2 Demographic information

Table 2 displays the demographic profile of the respondents, which included a total of 333 individuals. The table provides comprehensive information about the diverse backgrounds, extensive experience, and representative nature of higher education professors. A total of 79.6% of the respondents were male. The presence of a broad age range, particularly with significant proportions in the > 40–50 (36.6%) and > 50 (43.2%) age categories, indicates the presence of a group that is mature and has extensive experience. Interestingly, 90.1% of the individuals were married. Al-Quds Open University (21.6%), Al-Istiqlal University (16.5%), and Al-Quds University (15.3%) are three of the universities that make up the diversified academic community. Furthermore, 43.1% of the assistant professors had faculty members, 26.3% had lecturers, 15.3% had associate professors, and 9.6% had professors. This hierarchical distribution indicates that the sample is representative. Over 15 years of experience was reported by the majority (53.8%) of respondents. This substantial experience substantiates the notion that the sample consists of experienced professionals who contribute expertise and proficiency to their academic endeavours. This finding supports the claim that the sample is representative of the academic community in Palestine as a whole, showing that faculty members come from a wide range of demographic backgrounds. A wide variety of faculty members are represented, including those who differ from one another in terms of age, marital status, gender, academic status, years of experience, and university affiliations.

## 4.2 Assessment of the measurement model

In this stage, the researchers examined the measurement model to evaluate the quality of the constructs by assessing the factor loading and then establishing the reliability and validity of the constructs. Figure 2 shows the inner model for the first-order construct.

### 4.2.1 Factor loading

As recommended by Hair et al. [73], factor loadings of the items should be equal to or greater than 0.7. However, items with factor loadings of 0.05 or less were considered to be statistically acceptable if the values of internal consistency reliability, AVE, and HTMT were obtained. Hence, 6 items related to e-leadership and 4 items related to OCB were eliminated

**Table 2** Demographic information

		Frequency	Percent
Gender	Female	68	20.4
	Male	265	79.6
Age	23–30	7	2.1
	> 30–40	60	18
	> 40–50	122	36.6
	> 50	144	43.2
Marital status	Married	300	90.1
	Single	24	7.2
	Divorced	6	1.8
	Widowed	3	0.9
University affiliations	Al-Aqsa University	17	5.1
	AL-Azhar University	6	1.8
	Al-Istiqlal University	55	16.5
	Alnajah University	33	9.9
	Al-Quds Open University	72	21.6
	Al-Quds University	51	15.3
	Arab American University	21	6.3
	Berzit University	14	4.2
	Gaza University—Gaza	5	1.5
	Hebron University	33	9.9
	Islamic University of Gaza	10	3
	Palestine Technical University	16	4.8
Academic title	Teacher	18	5.4
	Lecturer	88	26.3
	Assistant professor	144	43.1
	Associate professor	51	15.3
	Professor	32	9.6
Years of experience	< 2	7	2.1
	2–5	17	5.1
	> 5–7	35	10.5
	> 7–10	57	17.1
	> 10–15	38	11.4
	> 15	179	53.8
	Total	333	100

from the model. Figure 2 and Table 3 show the factor loadings for the remaining factors and indicate that most of the items in the study had factor loadings higher than the recommended threshold of 0.70.

#### 4.2.2 Multicollinearity test

The variance inflation factor (VIF) is a statistical measure used to evaluate the presence of multicollinearity among indicators. For both reflective and formative models, testing for multicollinearity is important. Table 3 displays the VIFs for the indications in the study. The VIF for each indication is less than the suggested threshold of 0.5 [73].

#### 4.2.3 Reliability and convergent validity measures.

The results for both the Cronbach's alpha and composite reliability (CR) statistics are presented in Table 4. The Cronbach's alpha values varied between 0.702 and 0.96.2, whereas the composite reliability statistics ranged from 0.826 to 0.916. The reliability tests produced reliability statistics ranging from 0.70. Thus, the establishment of reliability is completed. Furthermore, PLS-SEM enables the construction of construct validity by incorporating both convergent validity and



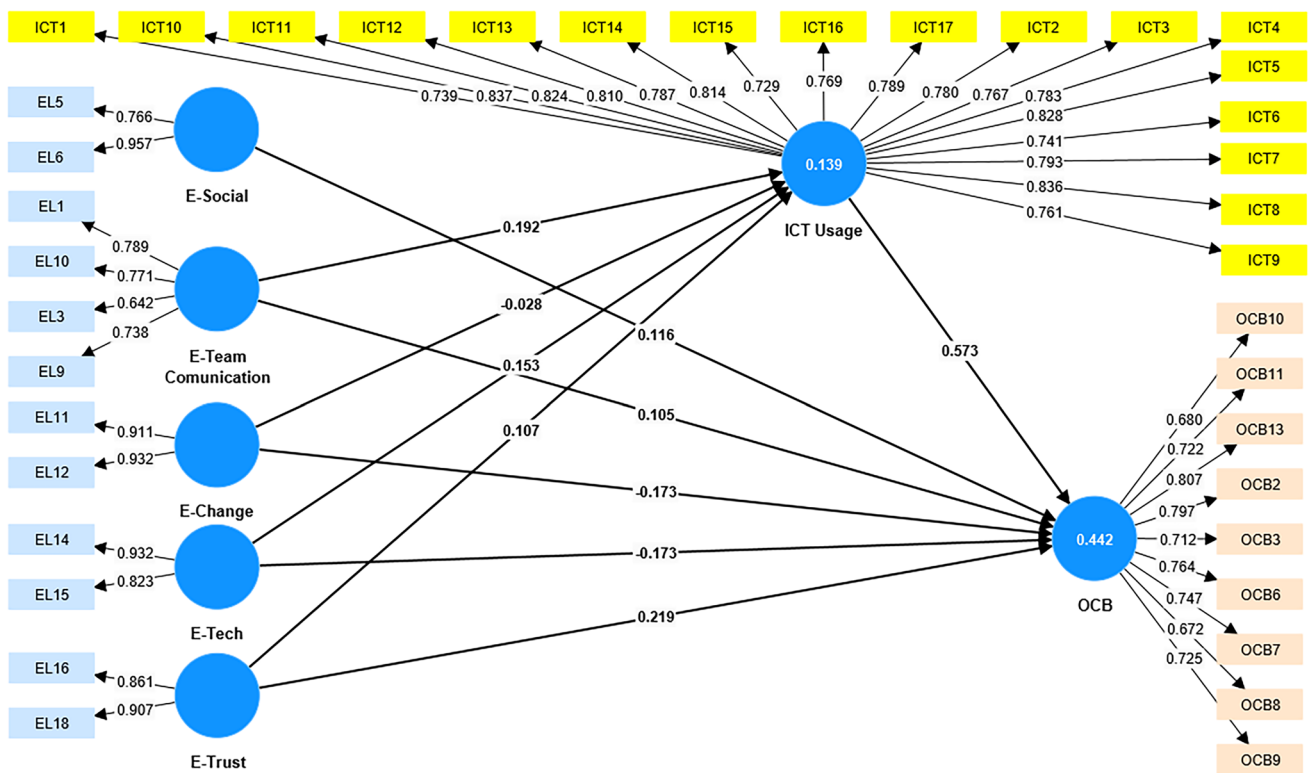


Fig. 2 The inner model for the first-order construct. Source: Smart-PLS4.0 11-12-2023

discriminant validity. Convergent validity is confirmed when the AVE value is equal to or exceeds the recommended threshold of 0.50. This indicates that the items effectively converge to measure the underlying concept. The present study’s convergent validity findings, as evidenced by the AVE statistics, suggest that all the constructs have an AVE value greater than 0.50. Therefore, the convergent validity of the model was confirmed.

**4.2.3.1 Discriminant validity** Discriminant validity refers to the extent to which measurements of different constructs are evidently distinguished. Per the criterion set by Furnell and Larker (1981), discriminant validity is confirmed when the square of the AVE for a construct exceeds its correlation with all other constructs. Table 5 shows that the square root of the AVE, indicated in bold and italics, for the construct was greater than its correlation with other constructs. Therefore, this strongly supports the creation of discriminant validity.

**4.2.3.2 Cross loadings** Cross loading is a method used to determine whether an item, which is part of a specific construct, has a high correlation with its own parent construct rather than with other constructs being studied. The Smart-PLS results shown in Table 6 indicate that the factor loadings of all items are greater when they are associated with their original construct than when they are associated with any of the other constructs in our model. Therefore, by evaluating the cross-loadings, we may determine that discriminant validity has been achieved.

**4.2.3.3 Heterotrait–Monotrait ratio (HTMT)** HTMT is derived from estimating the correlation between the constructs. Therefore, to verify discriminant validity, the researcher used the HTMT ratio. According to Teo et al. (2008), the accepted threshold for HTT is 0.90 or lower. The HTMT analysis reveals that the HTMT ratios in Table 7 are mostly below the specified threshold of 0.90.

**4.2.4 Validating the second-order construct**

One of the constructs was a formative construct that required a different validation process. The reliability and convergent validity of the second-order construct were also verified. To do so, the assessment of the measurement model for the second-order construct has been performed as suggested by Sarstedt et al. [74], who recommend that, in the case

**Table 3** Factor loading and multicollinearity statistics (VIF) for indicators

	Loading	VIF
EL1	0.766	1.525
EL3	0.957	1.203
EL5	0.789	1.424
EL6	0.642	1.424
EL9	0.738	1.319
EL10	0.771	1.603
EL11	0.911	1.963
EL12	0.932	1.963
EL14	0.932	1.461
EL15	0.823	1.461
EL16	0.861	1.474
EL18	0.907	1.474
ICT1	0.739	2.633
ICT2	0.780	3.284
ICT3	0.767	2.684
ICT4	0.783	2.546
ICT5	0.828	3.198
ICT6	0.741	2.664
ICT7	0.793	3.004
ICT8	0.836	3.371
ICT9	0.761	2.465
ICT10	0.837	3.696
ICT11	0.824	3.361
ICT12	0.810	2.907
ICT13	0.787	2.637
ICT14	0.814	2.972
ICT15	0.729	2.447
ICT16	0.769	2.768
ICT17	0.789	2.966
OCB2	0.797	2.458
OCB3	0.712	1.831
OCB6	0.764	2.160
OCB7	0.747	1.777
OCB8	0.672	1.611
OCB9	0.725	1.883
OCB10	0.680	1.672
OCB11	0.722	2.082
OCB13	0.807	2.330

**Table 4** Cronbach's alpha, composite reliability statistics, and average variance extracted (AVE)

	Cronbach's alpha	Composite reliability	Average variance extracted (AVE)
E-Change	0.824	0.919	0.850
E-Social	0.706	0.856	0.751
E-Team	0.718	0.826	0.543
E-Tech	0.719	0.872	0.773
E-Trust	0.724	0.878	0.782
ICT Usage	0.962	0.965	0.621
OCB	0.895	0.915	0.544

**Table 5** Discriminant validity—Fornell and Larker criterion

	E-Change	E-Social	E-Team	E-Tech	E-Trust	ICT Usage	OCB
E-Change	<b>0.922</b>						
E-Social	0.558	<b>0.867</b>					
E-Team	0.657	0.665	<b>0.737</b>				
E-Tech	0.528	0.485	0.563	<b>0.879</b>			
E-Trust	0.627	0.622	0.675	0.640	<b>0.884</b>		
ICT Usage	0.246	0.337	0.332	0.315	0.317	<b>0.788</b>	
OCB	0.147	0.334	0.308	0.171	0.324	0.619	<b>0.738</b>

Bolditalic values indicate the square root of AVE

**Table 6** Discriminant validity—cross loading

	E-team	E-social	E-change	E-tech	E-trust	ICT usage	OCB
EL1	0.789	0.545	0.517	0.445	0.521	0.291	0.216
EL9	0.738	0.407	0.426	0.389	0.500	0.224	0.308
EL10	0.771	0.574	0.771	0.553	0.612	0.239	0.155
EL3	0.642	0.448	0.250	0.283	0.360	0.220	0.209
EL5	0.536	0.766	0.487	0.448	0.562	0.225	0.164
EL6	0.624	0.957	0.507	0.429	0.556	0.337	0.361
EL11	0.601	0.498	0.911	0.483	0.558	0.215	0.121
EL12	0.610	0.530	0.932	0.490	0.596	0.238	0.149
EL14	0.552	0.468	0.519	0.932	0.589	0.329	0.172
EL15	0.420	0.375	0.391	0.823	0.539	0.204	0.121
EL16	0.550	0.507	0.504	0.539	0.861	0.262	0.248
EL18	0.638	0.588	0.598	0.590	0.907	0.297	0.319
ICT1	0.258	0.303	0.198	0.334	0.280	0.739	0.481
ICT2	0.218	0.248	0.195	0.284	0.272	0.780	0.489
ICT3	0.272	0.294	0.180	0.225	0.266	0.767	0.558
ICT4	0.156	0.233	0.116	0.223	0.209	0.783	0.456
ICT5	0.206	0.227	0.139	0.218	0.202	0.828	0.479
ICT6	0.231	0.233	0.177	0.261	0.215	0.741	0.457
ICT7	0.282	0.239	0.218	0.286	0.246	0.793	0.483
ICT8	0.341	0.301	0.230	0.260	0.309	0.836	0.514
ICT9	0.246	0.222	0.237	0.261	0.248	0.761	0.481
ICT10	0.269	0.289	0.191	0.263	0.249	0.837	0.532
ICT11	0.253	0.265	0.190	0.243	0.244	0.824	0.429
ICT12	0.288	0.259	0.243	0.303	0.276	0.810	0.402
ICT13	0.296	0.310	0.223	0.223	0.247	0.787	0.505
ICT14	0.251	0.232	0.220	0.216	0.250	0.814	0.474
ICT15	0.323	0.283	0.191	0.185	0.268	0.729	0.548
ICT16	0.265	0.296	0.167	0.176	0.233	0.769	0.479
ICT17	0.254	0.254	0.163	0.253	0.213	0.789	0.481
OCB2	0.280	0.335	0.139	0.117	0.285	0.472	0.797
OCB3	0.248	0.261	0.115	0.081	0.219	0.419	0.712
OCB6	0.248	0.279	0.055	0.121	0.241	0.462	0.764
OCB7	0.250	0.291	0.111	0.178	0.296	0.551	0.747
OCB8	0.262	0.246	0.150	0.117	0.276	0.354	0.672
OCB9	0.187	0.184	0.113	0.083	0.158	0.384	0.725
OCB10	0.164	0.180	0.084	0.107	0.169	0.446	0.680
OCB11	0.189	0.188	0.159	0.195	0.243	0.478	0.722
OCB13	0.209	0.221	0.067	0.122	0.239	0.504	0.807

**Table 7** Heterotrait–Monotrait ratio (HTMT) of the first-order construct

	E-Change	E-Social	E-Team	E-Tech	E-Trust	ICT	OCB
E-Change							
E-Social	0.740						
E-Team	0.867	0.933					
E-Tech	0.670	0.691	0.772				
E-Trust	0.805	0.884	0.933	0.883			
ICT usage	0.274	0.386	0.395	0.362	0.376		
OCB	0.173	0.369	0.374	0.204	0.394	0.658	

**Table 8** Second-order construct reliability and validity

	Cronbach's alpha	Composite reliability	Average variance extracted (AVE)
E-Leadership	0.883	0.914	0.681

**Table 9** Fornell and Lacker methods

	E-Leadership	ICT usage	OCB
E-Leadership	<b>0.825</b>		
ICT Usage	0.379	<b>0.788</b>	
OCB	0.326	0.620	<b>0.738</b>

**Table 10** Heterotrait–Monotrait ratio (HTMT) of the second-order construct

	E-Leadership	ICT usage	OCB
E-Leadership			
ICT Usage	0.405		
OCB	0.348	0.658	

of a discriminant validity test for a model that has one or more formative constructs, validating both the lower- and the second-order constructs is needed. In our case, our model has one reflective construct, which is e-leadership. Consequently, when assessing the reliability and validity of the second-order construct, the results of the regular algorithm shown in Table 8 indicate that both reliability and validity are valid, as the reliability value exceeded 0.70 and the AVE exceeded 0.50. Furthermore, Table 9. Fornell and Larcker showed that the square root of the AVE of each variable is greater than its correlation with all the other variables. However, Table 10 reveals that the HTMT ratios of all the values are below the specified threshold of 0.90.

### 4.3 Structural model evaluation

This study utilized a second-order approach to assess latent variables, taking into account dimensions and indicators. The objective was to examine the Inner Model and conduct hypothesis testing. This experiment employed the bootstrapping technique, aided by SmartPLS 4.0 software. As shown in Fig. 3 and presented in Tables 11 and 12, the structural model analysis shows that the direct and indirect paths are statistically significant at the 0.001 level. The results are explained in the following sections.

#### 4.3.1 Testing the direct effects among variables

The primary objective is to determine whether there is a statistically significant relationship between e-leadership and ICT adoption. The direct connection results showed that e-leadership significantly affects the use of ICT ( $\beta = 0.379$ ,  $t = 7.831$ ,  $p < 0.001$ ). Hence, testing H1 yielded positive results. The second hypothesis, H2, asks whether E-leadership significantly affects OCB. Based on the results, e-leadership significantly impacts OCB ( $\beta = 0.106$ ,  $t = 2.274$ ,  $p < 0.001$ ).

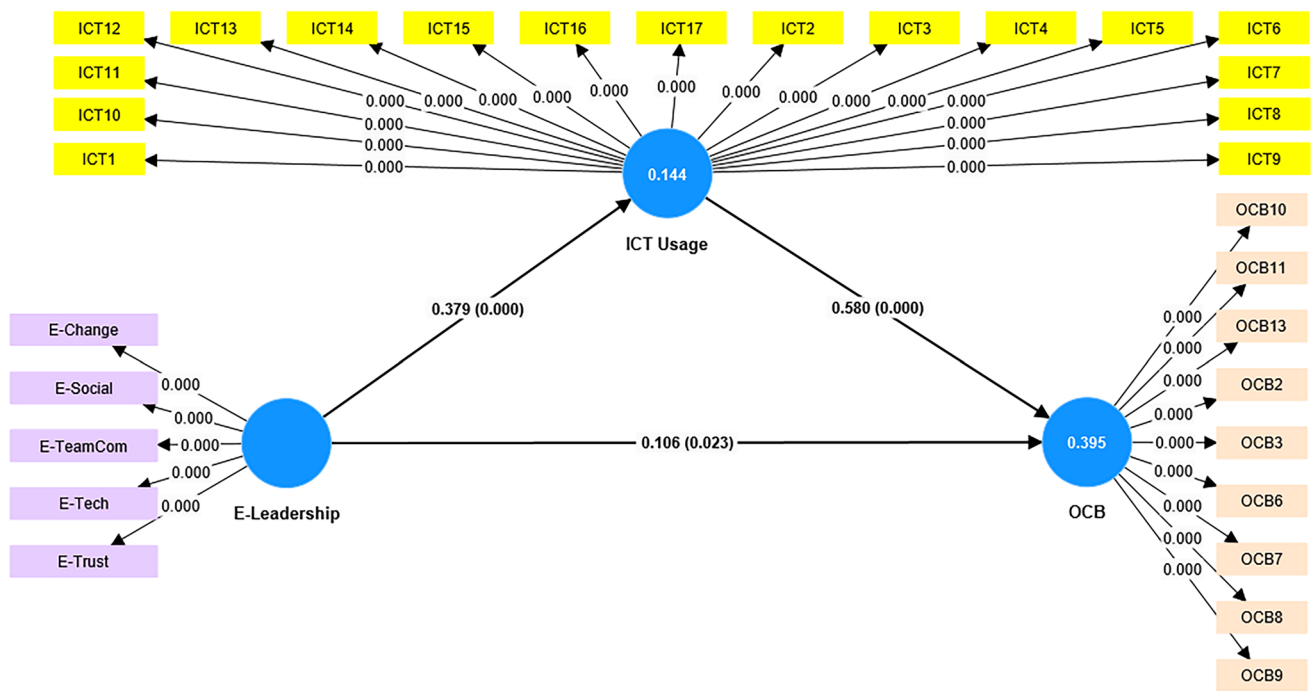


Fig. 3 Structural model of the second-order construct. Source: Smart-PLS4.0 11–12-2023

Table 11 Direct relationship results

	Original sample	Standard deviation	T statistics	P values
H1: E-Leadership → ICT Usage	0.379	0.048	7.831	0.000
H2: E-Leadership → OCB	0.106	0.046	2.274	0.023
H3: ICT Usage → OCB	0.580	0.050	11.570	0.000

Table 12 Specific indirect effects

	Standard deviation	T statistics	P values	Percentile bootstrap 95% Confidence intervals	
				Lower	Upper
H4: E-Leadership → ICT Usage → OCB	0.036	6.161	0.000	0.158	0.297

The results showed that the T value was greater than the cut-off value, e.g., 1.645 (+ or –), which statistically indicated a significant difference between the groups. This meant that H2 was supported. H3: Determining whether the use of ICT significantly affects OCB ( $\beta = 0.580, t = 11.570, p < 0.001$ ) shows that the use of ICT significantly impacts OCB. Hence, the results showed that H3 was supported.

#### 4.3.2 Testing the mediating effect of ICT usage

Assessing the mediating role of ICT usage in the relationship between e-leadership and OCB was the objective of the mediation analysis. A significant partial mediating role of ICT usage was found (H4:  $\beta = 0.220, t = 6.161, p = 0.000$ ) (Table 11). The significance level was set at  $p < 0.001$ . E-leadership had a total effect on OCB ( $\beta = 0.326, t = 6.302, p > 0.001$ ), and the direct effect was also significant when the mediator was included ( $\beta = 0.106, t = 2.274, p < 0.001$ ). Therefore, e-leadership and OCB are related, and ICT usage partially mediates this link.

Table 12, also displays the mediating effect in a path model, where E-leadership has an influence on OCB through the mediating variable ICT usage. The value of 0.220 represents the estimated mediating effect of ICT usage on the link between E-leadership and OCB. This finding indicates that a substantial percentage of the impact of e-leadership on OCB is mediated by ICT usage. The confidence interval (0.158 to 0.297) represents the range in which we may reasonably assert that an actual mediation effect exists. Essentially, the mediation effect indicates that the influence of e-leadership on OCB is partially explained by the role of ICT usage. The confidence interval provides an indication of the accuracy of this estimate. The confidence interval, with a lower bound of 0.158 and an upper bound of 0.297, provides additional information. The 95% confidence intervals (CIs) were calculated for the genuine mediation effect. To clarify, we can reasonably conclude that the influence of E-leadership on OCB, with the involvement of ICT usage as a mediator, lies within the range of 0.158 to 0.297.

## 5 Discussion and conclusion

### 5.1 Discussion and results

Researchers have stressed that the use of ICT mediates the relationship between e-leadership and faculty members' OCB. In particular, the study's findings show that ICT mediates the relationship between e-leadership and OCB. Consequently, enhancing faculty members' competency with information and communication technologies is perceived as a strategic way to improve several outcomes, including increased OCB, which increases support for colleagues and students, performance, and efficiency. Adopting this technique requires promoting empowering e-leadership practices among department heads and deans. This result aligns with the findings of Nugroho et al. [5], who stressed that higher education institutions should pay more attention to the OCB of their faculty members. Faculty members can adapt to different circumstances and thus can overcome the challenges they face by putting forth extra effort to ensure the effectiveness of distance learning [7, 20].

According to the data, employees are more likely to exhibit positive attitudes and behaviours when they receive sufficient support, which is in line with social exchange theory [65]. Additionally, since supervisors are representatives of the firm, organizational support theory states that workers interpret their supervisors' behaviours as an indication of the support given by the company. Examining the Palestinian higher education sector, the study revealed that faculty members' OCB is significantly correlated with e-leadership. OCB is greater among employees who have a positive impression of their managers' online leadership initiatives. Furthermore, academic staff members greatly value department chairs and deans who exhibit e-leadership traits and who help their colleagues advance in their careers. Therefore, by providing additional support and incentives, department chairs and deans should see an increase in OCB among faculty and staff. This finding is consistent with that of Chang et al. [2], who claimed that e-leadership can enhance the integration among team members, knowledge sharing, managerial strategies, and leadership practices through distance learning. Similarly, Wolor et al. [67] highlight that adopting proper leadership skills such as e-leadership along with utilizing proper ICT tools can augment work performance.

In summary, this research highlights the complex relationships among e-leadership, ICT proficiency, and OCB among faculty members in higher education. The results of efforts by academic institutions to cultivate a proactive and involved academic community in the postpandemic era highlight the importance of adaptive leadership and deliberate integration of technology.

### 5.2 Theoretical and managerial implications

This study contributes to our existing understanding of the impact of e-leadership on individuals' OCB, both within and outside of formal roles. This discovery has had a tremendous impact on both theoretical frameworks and management approaches. The study distinguishes itself from the implementation of ICT, a methodology that spans many stages of growth. During times of crisis, such as the COVID-19 outbreak, when remote work is prevalent, this elucidates how e-leadership enhances the OCB of faculty members. The findings of this study are aligned with Social Exchange Theory (SET), which highlights the importance of the quality of interactions between individuals, which may lead to the formation of obligations that keep changing over time or conditions [75]. Individuals tend to reciprocate and repay the support they receive from their leaders by actively engaging in OCB. Similarly, the Job Demands Resources Theory of Bakker Demerouti [76] suggests that working conditions share certain key attributes often found in various job roles that can be categorized



into job resources, personal resources and job demands. The leadership styles of leaders significantly affect their followers' engagement, which in turn impacts employees' OCB and well-being. This study also validates the findings of prior research, which indicate that academic leaders exert a significant influence on the behaviours and attitudes of faculty members in the workplace. Research specifically indicates that the ICT abilities of faculty members play a significant role as a mediator. The COVID-19 epidemic has highlighted the importance of e-leadership and technology in modern classrooms. It is evident that educators with proficient ICT skills were more actively engaged in OCB during this crisis.

With respect to practical and managerial implications, academic leaders, particularly department chairs and deans, should actively engage in continuous professional development initiatives that consider the evolving dynamics of distance learning and the integration of technology. This will enable them to effectively guide their academic strategy in the era following the epidemic. Universities should also allocate significant resources to training programs that enhance faculty members' technological proficiency, enabling them to effectively navigate the demands of online instruction and remote collaboration. Transitioning to strategic integration of technology into academic leadership practices has the additional benefit of fostering an environment where faculty ICT skills align with and improve organizational effectiveness.

### 5.3 Study limitations and future research

Although it was helpful to limit the study to academic supervisors in one area of Palestine to avoid cultural and organizational bias, it is still critical to repeat the research with managers at different levels, in various regions, and in different occupations to confirm the validity of our results. This study proposes prospective avenues for future academic research, namely, investigating the evolving correlation between e-leadership, employees' attitudes, and behaviours. The proposal suggests assessing individuals' ability to adapt to changing ICT environments over a specific duration. Moreover, the study proposes exploring the enduring effects of enhanced ICT capabilities on teacher conduct, with a particular emphasis on the present challenges presented by the COVID-19 pandemic and other recurring emergencies in Palestine, which have required a shift to remote learning. Further investigations into the many ways in which e-leadership leads to increased OCB should be undertaken. The effect of e-leadership on behaviours and attitudes inside the academic sector requires additional investigation. Furthermore, while the decision to limit this study to faculty members from higher education sector in particular region in Palestine was useful to understand the impact of intervening cultural and organizational aspects, still there is a need to conduct similar study in different sectors, regions, and occupational groups. Future study may also examine different mechanisms that may explain how e-leadership boost OCB of individuals.

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**Data availability** The datasets used and/or analyzed during the current study are available from the corresponding author upon reasonable request.

### Declarations

**Ethics approval and consent to participate** Informed consent was obtained from all participants in this study by proceeding with the survey after reviewing the email information. The author attests that participants were aware of the study's purpose, potential risks, and benefits. The author also emphasized the voluntary nature of participation, confidentiality measures, and participants' right to withdraw at any time.

**Consent for publication** Manuscript is approved by all authors for publication.

**Competing interests** The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest. The authors declare that they have no competing interests.

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