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# E-Leadership Competencies and Organizational Preference for Telework: Evidence from the Portuguese Context

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**Abstract**

This study examines the relationship between e-leadership competencies—assessed through a E-Leadership Competencies (SEC) model—and organizational preference for telework in Portugal. In the context of increasing digitalization and following the widespread experience of remote work driven by the COVID-19 pandemic, it becomes essential to understand the role of e-competence in leading geographically dispersed teams. A quantitative investigation was conducted through the application of an online questionnaire to e-leaders of companies based in Portugal whose teams benefit from telework arrangements. The results indicate that only three of the six e-competencies identified in the SEC model show statistical significance in e-leadership effectiveness, with no relationship observed between perceived effectiveness and organizational investment in telework. Nevertheless, more than 80% of respondents reported that telework has been increasing within their organizations. This study contributes to the adaptation of the SEC model to the Portuguese context and reinforces its importance as a tool for diagnosing and developing e-leadership competencies. Theoretical and practical implications highlight the need to explore new dimensions—including hard skills—and applying the model across different sectors and types of organizations, thus supporting the preparation of e-leaders for an increasingly digital world of work. Overall, by evidencing the SEC model's successful adaptation in Portugal, the findings underscore the model's broader applicability and potential for generalization across diverse organizational settings.

**Keywords:** e-leadership; telework; e-skills; e-leader; leadership competencies



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## 1. Introduction

Currently, the phenomenon of digital transformation (DT) is present in the organizational context. Researchers have been analyzing the impacts of DT on organizational management, namely in people management (Bhat & Sheikh, 2024; Husen et al., 2024; Rani Amalia, 2024; Zhang et al., 2025), in leadership (Hanandeh et al., 2023; Saepudin et al., 2024; Sainger, 2018), in technology (Alharbi, 2025; Kaur & Gandolfi, 2023; Saepudin et al., 2024), and in sustainability (Machado et al., 2025). In this context, the COVID-19 pandemic hastened DT due to lockdowns and the increasing adoption of telework, which became the most appropriate work model during 2019 to 2021 (Figueiredo et al., 2022; Zachariah et al., 2022). Thus, new concerns have emerged, mainly related to the role of the leader in teleworking contexts (Figueiredo et al., 2022; Figueiredo & Rodrigues, 2024).

DT has been profoundly redefining work models and the way organizations are led. In addition to promoting new work dynamics, it has also been imposing new challenges on organizational management, highlighting the importance of technology not only as support in the daily operations of companies but as a central element of culture, performance, and team well-being (Avolio et al., 2014; Pinto, 2023).

With the consolidation of telework, the need for a new leadership profile emerged: e-leadership (Avolio et al., 2014). This form of leading, adapted to digital contexts, requires a specific set of competencies—namely, the ability to communicate effectively in technology-mediated environments, to manage geographically dispersed teams, and to use digital tools to coordinate, motivate, and evaluate employee performance (Van Wart et al., 2018).

Despite the advantages of teleworking and the digital tools that support it, in recent years there has been a global trend of returning to in-person work, especially in large international organizations (Executive Digest, 2025; Exame, 2023). This reversal raises questions about the digital maturity of leadership and its ability to maintain a strong organizational culture, even at a distance. E-leadership, in this context, appears as a differentiating factor, since leadership mediated by information technologies is becoming increasingly relevant and distinct within the current administrative environment (Van Wart et al., 2017). However, leading remotely continues to be a challenge, especially for leaders trained in in-person contexts, who may present difficulties in tasks such as supervising team performance, maintaining trust, and managing virtual collaboration (Premuzic, 2025; Pinto, 2023).

Thus, understanding how leaders are adapting—and how this affects the continuity of telework—has become a relevant question, especially in geographies where greater resistance to returning to the office is observed, as is the case in Portugal (Redação, 2025; Jornal de Negócios, 2020).

Studying this topic is of particular importance, given the impact that the leadership model can have on talent retention, productivity, and organizational resilience in a world that is increasingly digital (Nova, 2025).

Despite the growing body of international research on e-leadership and telework, there remains a notable gap in empirical studies that apply and validate the skills for E-Leadership Competencies (SEC) model within the Portuguese organisational context. Existing literature has primarily focused on general leadership behaviours in digital environments, with limited attention to how specific e-leadership competencies influence organisational preferences for telework. This study addresses this gap by empirically testing the SEC model in Portugal, thereby contributing to the contextual adaptation and potential generalisation of the model. The available data suggest that Portugal has maintained a trajectory distinct from other countries, with a growing acceptance of telework by organizations (Redação, 2025; Expresso, 2025).

In this context, the present research arises from the need to understand the relationship between the e-leadership competencies of leaders in Portuguese companies and the evolution of the application of the telework regime in the country.

This study contributes to empirically tests the applicability of the SEC model (Van Wart et al., 2017) in the Portuguese context, offering insights into its cross-cultural adaptability. Identifying which specific e-leadership competencies are most strongly associated with perceived leadership effectiveness in telework settings. Providing evidence on the relationship (or lack thereof) between e-leadership effectiveness and organisational investment in telework and finally offers a validated diagnostic tool for assessing e-leadership competencies, which can inform leadership development and HR practices in digitally transforming organisations.

## 2. Literature Review and Hypothesis Development

### 2.1. Brief Context of Telework

New technologies have transformed society, including business sectors such as telework. While remote work is now common, research on the subject began in the 1970s (Ribeiro, 2022). In the following years, and more precisely from 1990 onwards, studies developed on telework referred to the possibility of working from home, within a reality of "boundaryless" organizations, attributing to technology the role of a link between employees and companies (Hafermalz, 2021), largely due to the expansion of the internet and globalization (Côrte, 2024). Remote work, previously optional for many years, became mandatory in 2020 for numerous companies, especially those in intellectual fields, due to the COVID-19 pandemic (Delfino & van der Kolk, 2021). In Portugal, guidelines from the World Health Organization (WHO) followed, recommending that, whenever work tasks allowed, they should be carried out through telework, avoiding the spread of the disease (Ribeiro, 2022).

According to the WHO and the International Labour Organization (ILO), telework refers to work carried out outside the company's premises, using information and communication technologies (ICT), allowing the performance of professional activities. This is the concept to be followed in this research, as it is considered the most comprehensive and includes the work practices associated with non-face-to-face work.

Employees and leaders may view telework differently. Telework offers employees benefits such as lower stress, improved work-life balance, increased productivity, time and cost savings on commuting and expenses, more autonomy, and greater control over their work schedules (Delfino & van der Kolk, 2021; Almeida, 2021).

The literature indicates that implementing telework presents certain challenges from the employee's perspective. Notable concerns include social isolation, decreased motivation, increased family conflicts, heightened turnover intentions among staff, and extended working hours (Ribeiro, 2022; Salin & Koponen, 2024). Physical distance limits direct supervision and emotional support from managers, which can cause insecurity and anxiety among employees who need close oversight. Studies show many leaders were unprepared for remote management during the pandemic, leaving employees feeling unsupported (Miras, 2022).

From a leadership standpoint, telework presents a range of both advantages and challenges. Key benefits include increased flexibility with respect to time and location, as well as enhanced collaboration facilitated by greater digitalization within organizations (Bellis et al., 2020). Similarly, the ease in task management and in maintaining effective virtual communication is seen as a benefit. In this sense, it is highlighted that leaders who effectively and widely use ICT can maintain a stable level of communication (Wang et al., 2023).

On the other hand, teleworking also brings significant challenges for leaders. One of the main ones is social isolation and the potential demotivation of teams, since telework can lead team members to experience social isolation, demotivation, family conflicts, and increased turnover intentions among employees (Salin & Koponen, 2024). Another relevant obstacle is the difficulty in maintaining organizational culture and a sense of belonging, considering that leaders recognize that the sense of community and company culture is weakened with hybrid or remote work (Salin & Koponen, 2024).

Finally, the literature mentions the so-called organizational paradoxes that challenge e-leaders, such as the paradox of belonging, where e-leadership requires flexibility and other competencies, such as self-management and co-determination skills, which often conflict with the organization's general processes (Kempner, 2022).

### 2.2. E-Leadership and the SEC Model

Since the beginning of the pandemic, digital technologies have become a more studied and debated topic (Bellis et al., 2020), including the relationship between ICT and leadership (Wang et al., 2023). Some studies suggest that the growth of e-leadership is directly associated with the proliferation of ICT use (Jameson et al., 2022) and that e-leaders who use ICT more consistently demonstrate more effective e-leadership (Wang et al., 2023).

Nevertheless, although topics related to digital technologies have been increasingly studied and discussed, the subject of e-leadership has not yet received as much attention from academic studies (Van Wart et al., 2017). The accelerated process of digitalization has boosted research and scientific production on e-leadership (Jameson et al., 2022), resulting in different interpretations of the concept today (Salin & Koponen, 2024). The literature emphasizes that the growing importance of e-leadership results from its direct impact on the ability of organizations to become more effective and competitive in the digital context.

E-leadership differs from traditional leadership. While both are based on leaders' influence over followers to achieve organizational goals, the way results are achieved in e-leadership differs from traditional leadership. E-leaders operate in a context fully influenced by ICT, requiring them to adapt to the new and complex digital world and to manage their teams within that environment (Grobman & Joia, 2022). In 2013, Hüsing et al. defined e-leadership as "the accomplishment of a goal that relies on ICT through the direction of human resources and uses of ICT," emphasizing exclusively the use of ICT by human resources (Hüsing et al., 2013, p. 4). Subsequently, Avolio et al. (2014) expanded the concept, describing e-leadership as "a social influence process embedded in both proximal and distal contexts mediated by AIT that can produce a change in attitudes, feelings, thinking, behavior, and performance" (Avolio et al., 2014, p. 107). Based on the proposed definition, the authors highlight the impact of leadership mediated by ICT on human behavior. Other definitions of the concept have emerged, such as that of Van Wart et al. (2017), which states that "E-leadership is the effective use and blending of electronic and traditional methods of communication. It implies an awareness of current ICTs, selective adoption of new ICTs for oneself and the organization, and technical competence in using those ICTs selected" (Van Wart et al., 2017, p. 4). In this study, the authors emphasize that the effectiveness of e-leadership does not necessarily imply greater use of ICT but rather a more efficient use of it, suggesting the use of ICT when advantageous, the selection of the best and most appropriate ICTs, considering the value of available resources, the use of face-to-face communication channels when more appropriate, and the competent use of ICT. The approaches mentioned above share the recognition of the central role of ICT in e-leadership, highlighting the effective use of technologies and the need for human resources to adapt to them.

Hüsing et al. (2013), in their study, argued that the demand for ICT was growing and that the development of digital skills was essential for companies to innovate and become competitive. In this context, e-skills are defined as the competencies required of an e-leader to explore opportunities provided by ICT, improve organizational performance, implement new business processes, and promote innovation (Hüsing et al., 2013). The study highlights that e-leaders should possess digital skills in a "T-shaped" format, encompassing two dimensions:

(i) Horizontal competencies: Represent transversal skills, with broad and interconnected knowledge across various areas.
(ii) Vertical competencies: Refer to in-depth and specialized knowledge in a specific area.

Analyzing the competencies that e-leaders should develop, and although these go beyond communication ability, communication plays a fundamental role (Van Wart et al., 2017). According to this study, communication is an essential skill for e-leadership because

it directly impacts the organization, helping to minimize the challenges faced by remote teams and to balance the flow of information through both digital and face-to-face means. Leaders use communication to ensure task completion and maintain positive relationships with their teams (Salin & Koponen, 2024).

Thus, e-leadership is characterized by the integration of traditional and virtual means of communication, promoting efficiency in communication and effectiveness in achieving goals related to tasks, people, organizations, and results (Wang et al., 2023). Communication occurs through both traditional channels and ICT, requiring e-leaders to find the most appropriate means to maximize communication effectiveness (Wang et al., 2023).

In addition to virtual communication abilities, building trust in the digital context is also considered a key factor for the success of teleworking teams (Kempner, 2022). Trust is viewed as a central element of e-leadership, with ICT acting as a tool that facilitates the building of trust-based relationships between e-leaders and team members (Van Wart et al., 2017). Thus, an effective e-leader knows how to use ICT to foster and strengthen trust among their team (Wang et al., 2023).

In this regard, Wang et al. (2023) highlight that teams with strong e-leadership use ICT more consistently than teams with weaker e-leadership. This occurs because effective e-leaders know how to alternate between different types of ICT, adapting their use to tasks and objectives. These leaders maintain stable levels of communication, flexibly alternating between virtual and traditional means according to circumstances, maintaining a high level of interaction with their teams (Wang et al., 2023). In this sense, strong e-leaders make extensive, flexible, and consistent use of communication media, focusing on building trust through ICT. They recognize that trust is an essential element of effective e-leadership, and the efficient use of ICT allows maintaining high levels of contact, which can lead to greater trust among teams (Wang et al., 2023). Nevertheless, the e-leader must demonstrate strong adaptability, being able to adjust and perform different leadership styles when necessary, showing a strong capacity for change management and adaptation to organizational complexity (Resende et al., 2013). According to the SEC Model (Van Wart et al., 2017), the e-leader should exhibit the following competencies: E-communication, E-social skills, E-team skills, E-change management skills, E-technological skills, and E-trust.

After defining what would constitute the essential competencies of an e-leader, the study by Van Wart et al. (2018) subsequently tested the SEC model to create an instrument capable of measuring and associating the e-leader competencies present in the model with the variable of leadership effectiveness. The study confirmed that although an e-leader does not need to excel in all six categories, a reasonable level of proficiency in all competencies of the SEC model is expected; otherwise, the individual cannot be considered an effective e-leader, as all six competencies are essential for good e-leadership. In this sense, the model of effective e-leadership by Van Wart et al. (2018), adapted to digital reality, is presented in Figure 1.

E-leadership presents several challenges that arise from profound DTs and the need to adapt to new forms of communication and people management. The literature indicates that electronic leadership can bring challenges to e-leaders, such as the lack of contact between them and their team members, which can hinder relationship development (Kempner, 2022), generate greater resistance from teams to digital changes, and lead to possible difficulties in implementing and using digital technologies appropriately and efficiently (Jameson et al., 2022).

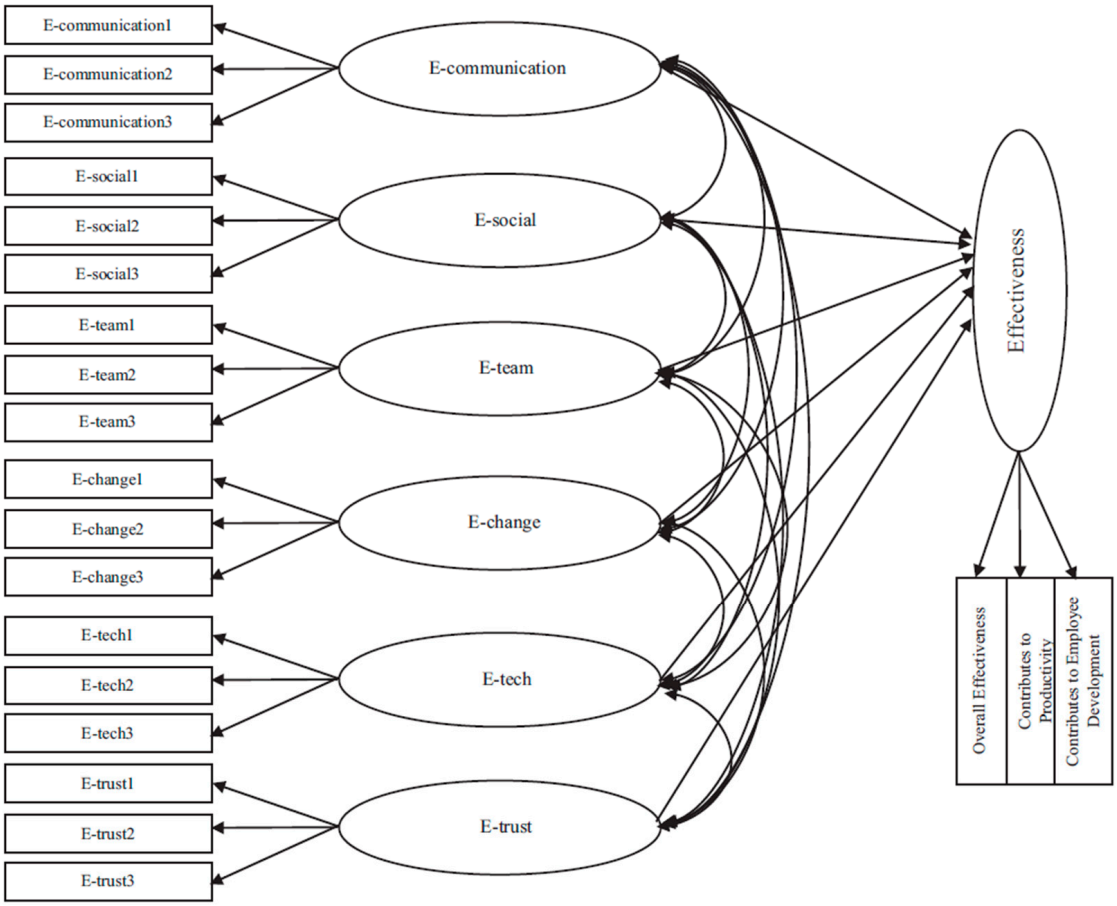


**Figure 1.** Leader Effectiveness Model (Van Wart et al., 2018).

The e-leader must possess not only leadership skills but also social and technological competencies, and this breadth of capabilities may itself represent a challenge for the e-leader (Kempner, 2022).

According to Kempner (2022), these challenges are complexity of required competencies, organizational paradox, performance paradox, learning paradox and belonging paradox. In addition to these paradoxes, the study by Purvanova and Kenda (2018) mentions the technological dependence paradox, the geographical dispersion paradox, human capital paradox. These challenges reflect the paradoxes inherent to e-leadership and emphasize the need for e-leaders to develop specific competencies to deal with the impacts of digitalization. The ability to overcome these challenges is directly related to adapting to technological changes and effectively managing teams in digital and dynamic environments (Kempner, 2022), as well as to the capacity to find synergies between the challenges and opportunities that e-leadership and telework may present—considering that followers are dispersed and information may also be fragmented, which can create a sense of disconnection within the team and the organization itself (Grobman & Joia, 2022).

### *2.3. The Return-to-Office Phenomenon*

The phenomenon of returning to in-person work (Return to Office–RTO) has been gaining momentum in recent years, especially among large companies. According to Executive Digest (2025), companies such as Apple, Amazon, Dell, and JPMorgan have implemented measures requiring their employees to return to the office either fully or partially. Some organizations demand that employees attend the office at least three or four days per week, as is the case with Disney, Apple, and Salesforce. Many of these

companies impose penalties, including the risk of dismissal, for those who do not comply with attendance requirements (Executive Digest, 2025; Exame, 2023).

Multiple academic perspectives have proposed various explanations for the resurgence of in-office work. Forbes (Premuzic, 2025) notes that this happens because companies value in-person culture, want to monitor productivity, and aim to justify real estate expenses. Certain leaders maintain that an in-person work environment strengthens corporate values; however, Forbes (Premuzic, 2025) cites research demonstrating that organizational culture may also be effectively preserved within remote settings.

In-person collaboration is often cited to support office returns, with managers claiming it enhances spontaneous interactions and knowledge sharing. However, physical workplaces can lead to more distractions and reduced productivity for detail-oriented tasks (Premuzic, 2025). Additionally, leaders may use in-person work to reinforce hierarchy, but this can stifle creativity and lower motivation, resulting in less productive environments (Premuzic, 2025).

Considering these elements, organizations should strive to achieve an optimal balance between remote and onsite work arrangements, considering the requirements of each position and the preferences of their workforce. Productivity ought to be assessed according to the contributions employees make, rather than solely on their physical attendance in the workplace (Premuzic, 2025).

Jornal de Negócios (2020) revealed that most Portuguese workers prefer hybrid work, citing improvements in productivity and quality of life. However, it also mentioned challenges related to communication and mental health, highlighting the need for balance between telework and in-person work (Jornal de Negócios, 2020). A recent study by Expresso (2025) stated that telework gained strength with the pandemic, as mentioned previously, and after an initial decline following the end of COVID-19, it began to grow again in Portugal (Expresso, 2025). The Portuguese Labor Code regulates telework to define and harmonize its use in the country. Law No. 83/2021 established that, whenever possible, employees may benefit from teleworking, prohibiting employers from contacting them outside working hours, thus reducing feelings of overload. At the same time, Portuguese legislation has evolved to ensure the right to telework in certain situations, such as for parents of children with chronic illnesses or children under three years old, if agreed upon with the employer (Law n.º 83/2021, 2021).

The evolution of telework in Portugal, from its early experiences in the 1990s (Simões, 1998) to its post-pandemic consolidation (Expresso, 2025), demonstrates a sustained growth trend supported by technological advancements and increasingly worker-protective legislation (Law n.º 83/2021, 2021). Despite the international discourse around the return to office, in Portugal there is a growing appreciation for remote and hybrid work, associated with productivity and quality-of-life gains but also with communication and mental health challenges (Jornal de Negócios, 2020; Redação, 2025). In this context, e-leadership plays a central role—not only due to the need to manage remote teams but also because of the importance of developing digital skills and promoting inclusion, in line with the technological transformation expected in the coming years (World Economic Forum, 2025).

### *2.4. Hypotheses Development*

Taking into consideration the reviewed literature, the following question raised: Does the presence of e-leadership characteristics positively influence the organizational decision to maintain or expand the telework regime in Portugal? The primary aim of this research is to examine the extent to which e-leadership characteristics among e-leaders in Portuguese organizations influence the increasing adoption of telework, in contrast to the global shift

back toward on-site work (Exame, 2023; Premuzic, 2025). Aiming to answer the above central gap, two research questions were formulated:

Q1: Considering that a good e-leader demonstrates the six e-competencies of the SEC Model, can it be stated, based on the results obtained, that the competencies of the SEC Model are positively related to e-leadership effectiveness?

Q2: Is the organizational decision to maintain or expand remote work arrangements in Portugal positively influenced by the presence of good e-leaders? For the first question, 6 hypotheses were set:

**H1.1.** *There is a positive association between e-leaders' level of e-technological competence and e-leadership effectiveness as measured by the SEC Model.*

E-technological competence refers to an e-leader's literacy and skill in using digital tools and platforms, as well as their openness to adopting new technologies (Van Wart et al., 2017). Leaders proficient in technology can exploit ICT capabilities to communicate, coordinate work, and make informed decisions efficiently. Hüsing et al. (2013) argue that modern leaders need strong "e-skills"—A combination of broad digital awareness and in-depth technical knowledge–to drive innovation and performance. In virtual team settings, a leader's comfort with technology directly affects their ability to manage remote collaboration (Van Wart et al., 2018). Leaders with higher technological competence are better at selecting and utilizing appropriate digital tools, which contribute to smoother team workflows and problem-solving in telework environments. By contrast, low technological competence can hinder communication and credibility, as subordinates may perceive the leader as a bottleneck or ill-equipped for digital coordination. Therefore, H1.1 suggests that an e-leader's technological competence is positively associated with their e-leadership effectiveness (Van Wart et al., 2018). In other words, leaders who are more adept with ICT are expected to be more effective e-leaders.

**H1.2.** *There is a positive association between e-leaders' level of e-communication competence and e-leadership effectiveness as measured by the SEC Model.*

E-communication competence is the ability to convey information clearly and effectively through electronic channels, while appropriately balancing these with face-to-face communication (Van Wart et al., 2017). Effective virtual communication is repeatedly identified as a critical success factor for remote leadership. It entails not only clarity and timeliness of messages but also the capacity to listen and encourage feedback in an environment where visual cues may be lacking. Prior studies note that miscommunications are common in virtual settings, which can diminish team performance and trust (Wang et al., 2023). Leaders who excel in e-communication proactively prevent misunderstandings by choosing the right communication medium for the message and by confirming mutual understanding (Salin & Koponen, 2024). Van Wart et al. (2017) emphasize that e-communication skills help minimize the challenges faced by dispersed teams, ensuring tasks are understood and relationships maintained. For instance, an e-leader might use video calls for sensitive or complex discussions (to add non-verbal context) and written channels for straightforward updates, demonstrating communicative adaptability. Accordingly, H1.2 proposes a positive association between an e-leader's communication competence and e-leadership effectiveness. An e-leader who communicates proficiently through ICT is expected to lead more effectively, as communication underpins coordination, feedback, and team morale in telework contexts.

**H1.3.** *There is a positive association between e-leaders' level of e-social competence and e-leadership effectiveness as measured by the SEC Model.*

E-social competence includes interpersonal skills and emotional intelligence an e-leader needs to support and connect with team members in a virtual environment. This includes showing empathy, understanding team members' needs, and maintaining positive relationships despite physical distance. High e-social competence enables a leader to sense team morale and individual concerns through virtual interactions and to address them appropriately. Research shown that a leader's emotional intelligence and social awareness contribute to leadership success (Ölçer et al., 2014), and this is equally true in e-leadership. In remote settings, where informal face-to-face interactions are absent, e-leaders must be deliberate in fostering companionship and a sense of belonging (Kempner, 2022). For example, checking in on employees' well-being during virtual meetings or creating opportunities for team bonding via digital platforms are part of e-social competence. Van Wart et al. (2018) imply that an effective e-leader exhibits strong social skills–they can build relationship and team cohesion online, which in turn enhances trust and collaboration. Thus, H1.3 posits that greater e-social competence in a leader is positively related to e-leadership effectiveness. A socially adept e-leader is more likely to maintain team engagement and loyalty, improving overall leadership outcomes.

**H1.4.** *There is a positive association between e-leaders' level of e-team competence and e-leadership effectiveness as measured by the SEC Model.*

E-team competence refers to a leader's ability to build, develop, and manage teams in a virtual or geographically dispersed context. This involves setting clear goals, coordinating tasks, and fostering collaboration without the benefit of physical proximity. Leaders strong in e-team skills are adept at using digital project management tools, facilitating virtual teamwork, and maintaining group cohesion and motivation remotely (Van Wart et al., 2018). Prior studies highlight that virtual team performance relies heavily on leadership behaviors that promote clarity, support, and regular interaction among team members (Wang et al., 2023). An e-leader with high team management competence will implement practices like regular virtual check-ins, collaborative platforms for knowledge sharing, and recognition of team achievements, thereby mitigating feelings of isolation or fragmentation on the team. By contrast, a leader who struggles in managing remote teams may face issues like reduced team engagement or confusion in task allocation. Consistent with the SEC model's assertions, H1.4 proposes a positive relationship between e-team competence and e-leadership effectiveness. Leaders who excel at managing virtual teams are expected to be viewed as more effective e-leaders because they can sustain team performance and unity in a telework setting.

**H1.5.** *There is a positive association between e-leaders' level of e-change management competence and e-leadership effectiveness as measured by the SEC Model.*

E-change management competence is the capability of an e-leader to guide and implement change in an organization, particularly changes associated with digital transformation or new ways of working. This competence includes strategic thinking, adaptability, and the skill to rally people around new initiatives in a virtual context. Effective e-leaders must often champion digital innovations or process changes and do so while managing resistance that can arise due to distance and uncertainty (Resende et al., 2013). For example, introducing a new collaborative software to a remote team requires the leader to not only understand the tool (technological competence) but also to manage the transition,

train team members, and encourage adoption (change management competence). The literature suggests that leaders who are resilient and proactive in the face of change tend to maintain team effectiveness during transitions (Kempner, 2022; Purvanova & Kenda, 2018). In e-leadership, this can mean updating team norms for virtual work or finding innovative solutions to original problems. Accordingly, H1.5 posits that an e-leader's change management competence is positively associated with e-leadership effectiveness. An e-leader who capably manages change and digital disruption is likely to be seen as effective, as they can steer their team smoothly through evolving work conditions.

**H1.6.** *There is a positive association between e-leaders' level of e-trust competence and e-leadership effectiveness as measured by the SEC Model.*

E-trust competence involves the ability of a leader to establish and maintain trust with and among team members via electronic means. Trust is frequently cited as a cornerstone of effective virtual teamwork: without daily in-person interactions, team members must have confidence in their leader's integrity and in each other's reliability (Zimmermann, 2011). An e-leader skilled in building trust will use consistent communication, transparency, and reliability to foster a trusting climate. This might include setting clear expectations, following through on commitments, and using ICT to keep teams connected and informed (Wang et al., 2023). Van Wart et al. (2017) underline that trust is a central element of e-leadership, noting that technology should be used to facilitate trust-based relationships. Research by Wang et al. (2023) found that teams with strong e-leadership had higher trust, as their leaders effectively alternated between communication channels to stay engaged with team members. In contrast, weak trust can significantly undermine remote employee engagement and performance, as individuals might feel less accountable or supported. Thus, H1.6 proposes a positive association between e-trust competence and e-leadership effectiveness. An e-leader who can cultivate trust through virtual means is expected to lead more effectively, as trust enhances cooperation and reduces the friction of remote coordination.

For the second question, a single hypothesis was set:

**H2.** *There is a positive association between the presence of the six e-competencies of the SEC Model in e-leaders—constituting the profile of an effective e-leader—and the organizational preference for telework in Portugal.*

Beyond individual leadership effectiveness, this study also examines whether effective e-leaders influence an organization's stance on telework. Organizational preference for teleworking refers to the degree to which an organization is willing to maintain or expand remote work arrangements. The premise of H2 is rooted in the idea that when leaders are skilled in e-leadership, they can address many challenges that telework presents thereby making telework a more viable and attractive option for the organization. Previous studies suggest that leadership support and capability are critical for successful telework implementation (Figueiredo et al., 2022). If e-leaders can ensure that their remote teams remain productive, engaged, and aligned with organizational goals, top management may be more confident in allowing teleworking to continue or grow. Conversely, if leaders struggle with managing remote teams, organizations might retreat from telework due to concerns over performance or culture. For example, strong e-communication and e-trust practices can ease management's fears about lack of oversight in telework, and effective use of technology can maintain operational continuity (Wang et al., 2023; Salin & Koponen, 2024). Considering Portugal's context—where telework has been gaining acceptance (Expresso, 2025)—understanding this leadership-telework link is particularly pertinent. Accordingly, H2 theorizes that the presence of an effective e-leader is positively associated with the organization's preference for main-

taining or expanding telework arrangements. In summary, organizations led by competent e-leaders are hypothesized to be more likely to embrace telework as a long-term practice.

## 3. Materials and Methods

### 3.1. Methodological Framework

This research uses a quantitative approach with structured questionnaires to collect data. Inductive reasoning guides the study, aiming to identify patterns linking e-leadership competencies to telework adoption in Portuguese organizations. While the sample includes participants from diverse sectors and organizational sizes, it does not constitute a probabilistic or statistically representative sample of the broader population of Portuguese e-leaders. Therefore, the findings should be interpreted with caution regarding generalizability, and are best understood as exploratory insights into the relationship between e-leadership competencies and telework preferences in the Portuguese context.

The e-leadership competencies are based on the SEC model proposed by Van Wart et al. (2017), which was later tested and validated through confirmatory factor analysis, leading to the design of a valid instrument for measuring e-leader competencies and deepening the understanding of e-leadership as a construct. As argued by Van Wart et al. (2018), it is essential to ensure that these indicators are interrelated and effectively measure the same underlying construct—namely, the e-competences of e-leaders within e-leadership contexts (Van Wart et al., 2018).

The dependent variable "Effective e-Leader" was constructed to reflect the overall effectiveness of respondents in fulfilling the six core competencies defined by the SEC model (Van Wart et al., 2017). Each of the six SEC dimensions were measured using three items on a five-point Likert scale. For each dimension, a composite score was calculated by averaging the responses to its three items, following the procedure validated by Van Wart et al. (2018). To operationalize the "Effective e-Leader" variable for logistic regression analysis, a dichotomous classification was applied. Respondents were classified as "Effective e-Leaders" (coded as 1) if they scored above the overall sample mean in at least five out of the six SEC dimensions. This threshold was chosen to reflect a high and consistent level of competency across the majority of the model's domains, aligning with Van Wart et al.'s (2018) assertion that effective e-leaders must demonstrate balanced proficiency across all six competencies. Respondents who did not meet this criterion were classified as "Not Effective e-Leaders" (coded as 0).

This dichotomization approach ensures interpretability and analytical clarity in the logistic regression model, while maintaining theoretical alignment with the SEC framework. It also allows for the identification of key competencies that significantly increase the likelihood of being perceived as an effective e-leader in telework contexts.

### 3.2. Data Collection Instrument

The validation of the instrument in the reference study involved an analysis of the internal consistency of each dimension using Cronbach's alpha coefficient (Van Wart et al., 2018). Accordingly, and in line with the original study by Van Wart et al. (2018), the present research adopts a rigorous approach to the empirical validation of the data collection instrument, ensuring that the indicators used to measure e-leadership are both reliable and theoretically consistent. The questions included in Van Wart et al.'s (2018) study, which relate to the six competencies of the SEC model, were translated into Portuguese to design a questionnaire targeted at team leaders working in organizations based in Portugal that offer the option of telework.

### 3.3. Research Procedures

The development of this research followed several methodological stages, organized in a sequential manner. A questionnaire was administered with the aim of testing the research hypotheses initially formulated. To this end, the questions from the instrument developed by Van Wart et al. (2018) were translated and culturally adapted, since this tool was originally designed as a scale for measuring e-leadership. To ensure that the questionnaire was both understandable and applicable to the Portuguese context, it was translated from its original language (English) into Portuguese. The questionnaire used in this study is based on the following research model (Figure 2):

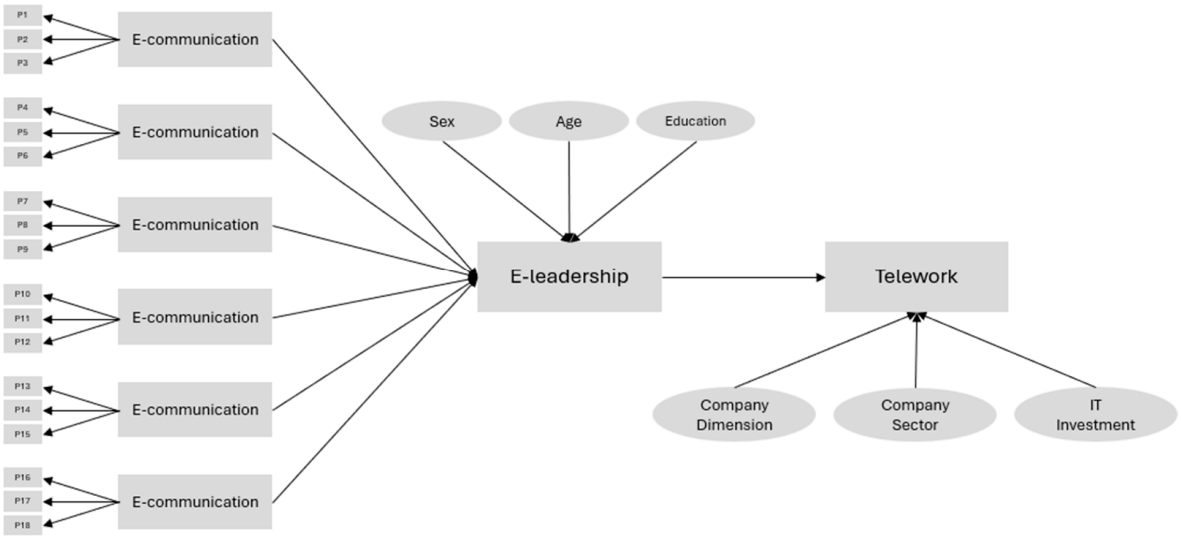


**Figure 2.** Research model based on SEC model proposed by Van Wart et al. (2018).

### 3.4. Questionnaire

#### 3.4.1. Procedure and Sampling Strategy

This study employed a non-probabilistic, purposive sampling strategy, targeting individuals who currently hold leadership positions in Portuguese organisations and manage teams that operate partially or fully in telework arrangements. The target population consisted of e-leaders across various sectors, with a focus on those working in medium to large enterprises where telework practices are more prevalent.

The questionnaire was distributed online via Google Forms and disseminated through professional networks, including LinkedIn and Facebook, as well as internal communications within organisations. This approach was chosen to maximise reach and ensure participation from a diverse range of industries and organisational sizes. A total of 129 responses were received. After applying the inclusion criteria—specifically, that respondents must hold a leadership role and manage employees engaged in telework—117 valid responses were retained for analysis. This corresponds to a valid response rate of approximately 90.7%.

Although the total size of the target population is not precisely known due to the open distribution method, the sample size of 117 is considered adequate for the statistical techniques employed, including logistic regression and reliability analysis. The sample is also demographically and sectorally diverse, with representation from technology, services, commerce, and other sectors.

To assess potential non-response bias, early and late respondents were compared on key demographic and response variables. No statistically significant differences were found, suggesting that non-response bias is unlikely to have materially affected the results. The sixth question "Do you currently hold a leadership position in your organization,

assuming responsibilities for managing and supervising employees?" filtered participants to include only those relevant to the study. Only respondents who answered "Yes, with employees working partially or fully in remote work" were included for hypothesis testing (see Table 1).

**Table 1.** Data related to question 6.

| Do You Currently Hold a Leadership Position in Your Organization, Assuming Responsibilities for Managing and Supervising Employees? | Counts | % of Total | Cumulative |
|---|---|---|---|
| No | 9 | 7.0% | 7.0% |
| Yes, with employees working exclusively on-site | 3 | 2.3% | 9.3% |
| Yes, with employees working partially or fully in telework | 117 | 90.7% | 100.0% |

Regarding the exercise of leadership functions, an absolute majority of respondents (90.7%, n = 117) reported holding leadership positions involving telework (partial or full). Only 2.3% (n = 3) led teams worked exclusively on-site, and 7% (n = 9) indicated that they did not hold leadership roles. Thus, from the initial total sample of 129 responses, only 117 were retained as valid responses from e-leaders, which were subsequently used for the testing of research hypotheses.

#### 3.4.2. Sample Description

After the initial screening, it was found that among the 117 participants, 55.6% were female (n = 65) and 44.4% male (n = 52). Table 2 summarizes the sample in terms of demographics and organizational characteristics.

**Table 2.** Sample Demographics and Organizational Characteristics (N = 117).

| Characteristic | Category | Frequency (n) | Percentage (%) |
|---|---|---|---|
| Gender | Female | 65 | 55.6 |
| | Male | 52 | 44.4 |
| Age Group | 25–34 years | 48 | 41.0 |
| | 35–44 years | 51 | 43.6 |
| | 45–54 years | 18 | 15.4 |
| Education Level | Secondary Education | 5 | 4.3 |
| | Technical/Vocational Qualification | 4 | 3.4 |
| | Bachelor's Degree | 54 | 46.2 |
| | Master's Degree | 53 | 45.3 |
| | Doctoral Degree | 1 | 0.9 |
| Sector | Technology & Communication | 61 | 52.1 |
| | Commerce & Services | 36 | 30.8 |
| | Industry/Construction | 6 | 5.1 |
| | Education/Healthcare | 3 | 2.6 |
| | Public Administration | 1 | 0.9 |
| | Other | 10 | 8.5 |
| Organisation Size | Micro (<10 employees) | 5 | 4.3 |
| | Small (10–49 employees) | 2 | 1.6 |
| | Medium (50–249 employees) | 12 | 10.3 |
| | Large (≥250 employees) | 98 | 83.8 |

Most respondents were aged between 25 and 44 years: 41% were aged 25–34 years (n = 48), and 43.6% were aged 35–44 years (n = 51). Participants aged 45–54 years accounted for 15.4% of the sample (n = 18). Regarding educational level, the sample was found to be highly qualified: 46.2% held a bachelor's degree (n = 54), 45.3% a master's degree (n = 53),

4.3% had completed secondary education (n = 5), 3.4% held a technical or vocational qualification (n = 4), and 0.9% a doctoral degree (n = 1). These figures indicate that over 90% of participants possessed higher education qualifications (bachelor's, master's, or doctoral degrees).

Concerning the economic sector in which participants were currently employed, the majority worked in the technology and communication sector, representing 52.1% of the sample (n = 61). This was followed by the commerce and services sectors with 30.8% (n = 36), other non-specified sectors with 8.5% (n = 10), industry or construction with 5.1% (n = 6), education or healthcare with 2.6% (n = 3), and public administration with 0.9% (n = 1). With respect to company size, 83.8% of participants were employed in large organizations (250 or more employees; n = 98), 10.3% in medium-sized enterprises (50–249 employees; n = 12), 4.3% in microenterprises (fewer than 10 employees; n = 5), and 1.6% in small enterprises (10–49 employees; n = 2).

## 4. Results

### *4.1. Analysis of Variables and Scales*

The questionnaire items were treated as independent variables, each formulated as a behavioral statement to which respondents indicated their degree of agreement. All variables were measured using a five-point Likert scale, where 1 corresponds to "strongly disagree" and 5 to "strongly agree" (Likert, 1932).

The variables were organized into six dimensions, in accordance with the SEC model, and the internal consistency of each was assessed using Cronbach's alpha coefficient, as in the original reliability analysis of the questionnaire. For each variable, the Cronbach's alpha value is presented to evaluate its contribution to the internal reliability of the corresponding dimension. All obtained values were above 0.80, indicating high internal consistency, according to the criteria established by Hair et al. (2019). The E-Communication dimension was measured through three variables assessing the clarity and openness of electronic communication, the risk of misunderstandings, and the use of diverse digital channels (Table 3).

**Table 3.** E-Communication Dimension.

| Variable | Measurement Item | Scale Type | Scoring Direction | Cronbach's α |
|---|---|---|---|---|
| Clarity and openness in electronic communication | "In electronic communication with my team, I strive to express myself clearly and in an organized manner, encouraging feedback to prevent errors and unfounded assumptions." | Likert scale | Regular | 0.829 |
| Risk of misunderstandings | "In electronic communication with my team, I acknowledge that I may occasionally send unintended messages that make the recipient(s) feel offended or uncomfortable due to tone or potential misunderstandings." | Likert scale | Reverse-scored | 0.845 |
| Excessive use of digital channels | "My electronic communication is excessive to the point that it hinders employees' ability to work effectively." | Likert scale | Reverse-scored | 0.832 |

The E-Social dimension, which captures the e-leader's ability to adapt and diversify communication in a socially sensitive and effective way, was evaluated using three variables (Table 4).

**Table 4.** E-Social dimension.

| Variable | Measurement Item | Scale Type | Scoring Direction | Cronbach's α |
|---|---|---|---|---|
| Adaptation to individual characteristics | "The way I communicate electronically is sufficiently adapted to the individuality of each team member." | Likert scale | Regular | 0.828 |
| Variety of communication methods | "I use a considerable variety of electronic communication methods." | Likert scale | Regular | 0.829 |
| Enhancement of team communication and collaboration | "The virtual communication methods I use improve communication and collaboration within the team." | Likert scale | Regular | 0.829 |

The E-Team dimension was based on three variables reflecting the e-leader's role in motivating, empowering, and fostering cohesion within remote teams (Table 5).

**Table 5.** E-Team dimension.

| Variable | Measurement Item | Scale Type | Scoring Direction | Cronbach's α |
|---|---|---|---|---|
| Team building effectiveness in virtual environments | "I consider myself effective in building productive teams in virtual environments." | Likert scale | Regular | 0.820 |
| Motivation of virtual teams | "I am capable of motivating teams working virtually." | Likert scale | Regular | 0.817 |
| Accountability and cohesion in remote teams | "I ensure that my team understands and takes responsibility for its actions, decisions, and outcomes, even when members are working remotely." | Likert scale | Regular | 0.828 |

The E-Change dimension comprised three variables assessing the e-leader's use of ICT to plan, monitor, and evaluate organizational changes in telework contexts (Table 6).

**Table 6.** E-Change dimension.

| Variable | Measurement Item | Scale Type | Scoring Direction | Cronbach's α |
|---|---|---|---|---|
| ICT use for planning organizational changes | "I consider myself effective in using information and communication technologies (ICT) for planning organizational changes." | Likert scale | Regular | 0.825 |
| ICT use for monitoring organizational changes | "I am able to effectively monitor organizational changes through the use of ICT." | Likert scale | Regular | 0.821 |
| ICT use for evaluating organizational change outcomes | "I am effective in using ICT to evaluate the outcomes of organizational change initiatives." | Likert scale | Regular | 0.818 |

The E-Tech dimension included three variables measuring digital literacy, technological problem-solving ability, and preventive behavior in technology use (Table 7).

**Table 7.** E-Tech dimension.

| Variable | Measurement Item | Scale Type | Scoring Direction | Cronbach's α |
|---|---|---|---|---|
| Digital literacy and technological awareness | "I recognize that I do not keep myself up to date regarding new information and communication technologies (ICT) and recent innovations in virtual communication." | Likert scale | Reverse-scored | 0.840 |
| Technological problem-solving ability | "I possess the necessary skills and willingness to effectively deal with different types of technological failures, both personally and organizationally." | Likert scale | Regular | 0.828 |
| Cybersecurity awareness and preventive behavior | "I am aware and proactive regarding my actions in the field of cybersecurity." | Likert scale | Regular | 0.827 |

The E-Trust dimension was operationalized through three variables assessing the e-leader's ability to build trust, promote ethical behavior, and ensure inclusion among team members in virtual settings (Table 8).

**Table 8.** E-Trust dimension.

| Variable | Measurement Item | Scale Type | Scoring Direction | Cronbach's α |
|---|---|---|---|---|
| Building trust in virtual environments | "I create a sense of trust among my team members, even in virtual environments." | Likert scale | Regular | 0.825 |
| Ethical use of virtual communication | "I use various forms of virtual communication in an honest, conscientious, fair, committed, and ethical manner." | Likert scale | Regular | 0.829 |
| Inclusion and diversity support in virtual settings | "I ensure that support for diversity is present and systematically monitored within the organization's virtual environment." | Likert scale | Regular | 0.828 |

Each dimension included three items, and their average score represented that dimension. These averages were compared to assessing participants' alignment with an effective e-leader profile.

### *4.2. Descriptive Statistics and Correlation Analysis*

To characterize the study variables and verify the assumptions required for subsequent statistical analyses, a descriptive analysis of the data was conducted. For each of the 18 variables corresponding to the dimensions of the SEC model (Van Wart et al., 2017), measures of central tendency (mean and median), dispersion (standard deviation), range (minimum and maximum values), and skewness and kurtosis coefficients were examined.

The mean scores (Table 9) of the variables are mostly above the midpoint of the five-point Likert scale (3), indicating a generally positive perception of e-leadership competencies among participants.

Regarding dispersion, the standard deviations range from 0.494 (Communication1) to 0.984 (Tech1), with generally low values, indicating limited variability in responses. This suggests a degree of homogeneity in participants' perceptions of the assessed competencies.

**Table 9.** Descriptive Statistics for SEC Model Dimensions.

| Dimension | Variable | Scoring Direction | Mean (M) | Standard Deviation (SD) |
|---|---|---|---|---|
| E-Communication (M = 2.77; SD = 0.525) | Communication1 | Regular | 4.70 | 0.494 |
| | Communication2 | Reverse-scored | 1.95 | 0.917 |
| | Communication3 | Reverse-scored | 1.57 | 0.635 |
| E-Social (M = 3.91; SD = 0.814) | E-Social1 | Regular | 4.05 | 0.660 |
| | E-Social2 | Regular | 3.84 | 0.934 |
| | E-Social3 | Regular | 3.81 | 0.942 |
| E-Team (M = 4.05; SD = 0.584) | E-Team1 | Regular | 3.95 | 0.660 |
| | E-Team2 | Regular | 3.87 | 0.689 |
| | E-Team3 | Regular | 4.40 | 0.655 |
| E-Change (M = 4.12; SD = 0.696) | E-Change1 | Regular | 4.24 | 0.635 |
| | E-Change2 | Regular | 4.11 | 0.763 |
| | E-Change3 | Regular | 4.06 | 0.768 |
| E-Tech (M = 3.47; SD = 0.600) | E-Tech1 | Reverse-scored | 2.36 | 0.984 |
| | E-Tech2 | Regular | 3.89 | 0699 |
| | E-Tech3 | Regular | 4.17 | 0.719 |
| E-Trust (M = 4.43; SD = 0.583) | E-Trust1 | Regular | 4.40 | 0.579 |
| | E-Trust2 | Regular | 4.62 | 0.548 |
| | E-Trust3 | Regular | 4.23 | 0.796 |

To assess the normality of the variable distributions, skewness and kurtosis coefficients were analyzed. The most relevant skewness coefficients were found in Communication1 (skewness = 1.261; skewness coefficient = $-5.920 > 1.645$), Trust2 (skewness = $-1.072$; skewness coefficient = $-5.032 > 1.645$), and Trust3 (skewness = $-1.200$; skewness coefficient = $-5.633 > 1.645$), suggesting that participants tended to select higher options on the scale, reflecting highly positive perceptions in these domains and agreement with the corresponding statements. Several variables also showed significant negative skewness, such as E-Social1, E-Social2, E-Social3, E-Team2, E-Team3, E-Change2, E-Change3, E-Tech2, and E-Tech3.

Other variables displayed positive skewness, with E-Communication2 being the most notable (skewness = 1.326; skewness coefficient = $6.225 > 1.645$). This indicates that most participants selected low response values, as it is a reverse-scored item—meaning they disagreed with the statement about causing misunderstandings, which is a positive indicator of their e-communication competence. Other variables, such as E-Communication3 and E-Tech1, also exhibited positive skewness, consistent with the same logic, as both are reverse-scored items.

Regarding kurtosis, some significant values were identified, for instance, Communication2 (kurtosis = 2.322; kurtosis coefficient = 5.489) and E-Trust3 (kurtosis = 2.081; kurtosis coefficient = 4.919), suggesting that participants' responses were highly concentrated around a specific value, indicating strong consensus among respondents regarding these variables. Conversely, the variable Trust1 exhibited a significant negative kurtosis (kurtosis = $-0.734$; kurtosis coefficient = $-1.735$), indicating greater dispersion around the mean. Although the values do not deviate dramatically from centrality, this less concentrated distribution may reflect more varied interpretations among participants.

Descriptive statistics show a generally strong perception of e-leadership competencies, with data slightly skewed positively. Notable skewness and kurtosis suggest some variables deviate from normality, which should be considered when choosing statistical tests.

A binomial logistic regression was used for the first research question to assess how independent variables affected the likelihood of being an Effective e-leader, since this outcome was dichotomous and normality was not required. For the second question,

Fisher's exact test analyzed categorical variable associations, as it better suited small cell counts than the Chi-square test.

To assess potential multicollinearity among the independent variables included in the regression models, collinearity diagnostics were conducted using Variance Inflation Factor (VIF) and Tolerance values. According to Hair et al. (2019), VIF values below 5 and Tolerance values above 0.20 indicate an acceptable level of multicollinearity, suggesting that the independent variables do not exhibit problematic intercorrelations. As shown in Table 10, all VIF values ranged between 1.06 and 1.21, and Tolerance values ranged from 0.824 to 0.943. These results confirm that multicollinearity is not a concern in the present analysis, and the regression estimates can be considered robust and reliable.

**Table 10.** Colinarity Statistics.

| Dimension | VIF | Tolerance |
|---|---|---|
| E-Communication | 1.20 | 0.836 |
| E-Social | 1.21 | 0.824 |
| E-Team | 1.12 | 0.889 |
| E-change | 1.12 | 0.894 |
| E-Tech | 1.15 | 0.867 |
| E- Trust | 1.15 | 0.873 |
| Sex | 1.10 | 0.911 |
| Sector | 1.06 | 0.943 |

### *4.3. Hypothesis Testing*

As previously mentioned, to address the first research question and test the six proposed hypotheses, a binomial logistic regression was employed, given that the dependent variable—Effective e-Leader—is binary (1 = effective leader; 0 = not effective). Through this test, the influence of independent variables—in this case, the six dimensions of Van Wart et al.'s (2017) SEC e-leadership model—on the likelihood of a specific dichotomous outcome of the dependent variable (Effective e-Leader) was examined.

Regarding hypothesis 1.1, Van Wart et al. (2017) argued that e-leaders must keep current with effective communication technologies and assess their value to the organization. They should switch between traditional and digital tools as needed and address technology issues promptly, either independently or with support, to maintain team workflow. However, the results of the binomial logistic regression performed in this study ($p = 0.054 > 0.05$) show that the E-Tech dimension does not present statistical significance at the 5% level, indicating that there is no significant positive association between this competency and e-leadership effectiveness—contrary to the initial hypothesis. This means that, among the e-leaders surveyed, higher E-Tech skills do not necessarily translate into a greater perception of e-leadership effectiveness.

Concerning hypothesis 1.2, Van Wart et al. (2017) argued that communication is a key competency of an effective e-leader, which must be clear, sufficient, and structured to avoid misunderstandings, enabling feedback exchange without becoming excessive. However, the results obtained from the survey conducted in this study ($p = 0.138 > 0.05$) provide evidence that the E-Communication dimension does not present statistical significance in the binomial logistic regression model at the 5% level, indicating that no significant positive association was found between this competency and e-leadership effectiveness—contrary to Van Wart et al.'s (2017) findings.

Regarding hypothesis 1.3, the E-Social dimension showed statistical significance in the model ($p < 0.001 < 0.05$), indicating a positive association between e-leaders' social competencies and the Effective e-Leader variable at the 5% significance level. Thus, the higher the e-leader's E-Social competence, the greater the perceived effectiveness of their

e-leadership. This result supports Van Wart et al.'s (2017) assertion that effective e-leaders provide team support through diverse communication methods (digital or traditional) that are appropriate to individual circumstances.

Concerning hypothesis 1.4, the E-Team dimension showed statistical significance ($p = 0.033 < 0.05$), indicating a positive association between e-leaders' team-building competencies and the Effective e-Leader variable at the 5% significance level. Practically, this means that higher E-Team competence corresponds to a higher perceived effectiveness of e-leadership. This finding aligns with the theoretical framework of Van Wart et al. (2017), who argue that an effective e-leader can motivate their team in a virtual environment, reinforce each member's purpose, and ensure that all team members contribute meaningfully, take responsibility for their work, and are duly recognized and rewarded, as in traditional, face-to-face teams.

Concerning hypothesis 1.5, the E-Change dimension presented statistical significance ($p = 0.006 < 0.05$), indicating a positive association between e-leaders' change management competencies and their perceived e-leadership effectiveness. This result suggests that higher levels of E-Change competence correspond to greater perceived e-leadership effectiveness. This finding supports the theoretical argument of Van Wart et al. (2017), who emphasize that e-leaders possessing E-Change competence use effective techniques to manage organizational change through planning, monitoring, and optimizing technology use.

Regarding hypothesis 1.6, the E-Trust dimension did not show statistical significance in the model ($p = 0.287 > 0.05$), indicating no significant positive association between e-leaders' trust-building competencies and the perceived effectiveness of their e-leadership. This finding contrasts with Van Wart et al. (2017), who argue that effective e-leaders foster trust by demonstrating honesty, integrity, consistency, and fairness. They ensure their teams feel secure, aware of cybersecurity risks, and confident that personal data are protected. E-leaders balance efficiency with workload management, supporting team members in maintaining work-life balance. Additionally, they promote diversity and inclusion even in virtual contexts, ensuring all members feel supported and represented (Van Wart et al., 2017).

As discussed, these dimensions significantly increase the likelihood of an e-leader being classified as an Effective e-Leader, suggesting that social, team building, and change-management competencies are key drivers of e-leadership effectiveness.

Conversely, the E-Communication ($p = 0.138 > 0.05$) and E-Trust ($p = 0.287 > 0.05$) dimensions did not exhibit statistically significant associations with e-leadership effectiveness, while the E-Tech dimension ($p = 0.054 > 0.05$) showed a marginal result, suggesting a possible negative trend that did not reach conventional statistical significance at the 5% level.

These results indicate that, among the six dimensions evaluated, social, team, and change-management competencies are the strongest predictors of leadership effectiveness in telework environments, partially confirming the hypotheses based on theoretical and empirical literature.

Regarding the second research question (H2), Fisher's Exact Test was employed, as the assumptions for the Chi-square test were not met. The choice for the Fisher's Exact Test was made due to the distribution of responses across the contingency table, which included several cells with expected frequencies below 5. While the Chi-square test is commonly used for testing associations between categorical variables, it relies on the assumption that expected cell frequencies are sufficiently large (typically $\geq 5$). Since this assumption is violated, Chi-square is not applicable and the validity of the results are compromised (Field, 2013; Agresti, 2002). In contrast, Fisher's Exact Test does not rely on large-sample approximations and is particularly well-suited for small sample sizes or sparse data tables.

Given the relatively small number of respondents in some categories of the "organizational investment in telework" variable, Fisher's Exact Test was selected to ensure the robustness and reliability of the statistical inference. This approach enhances the methodological rigor of the analysis by providing an exact p-value, thereby avoiding the potential biases associated with asymptotic methods in small samples.

This test calculates the exact probability of obtaining the observed results (or more extreme outcomes) under the null hypothesis that there is no association between the variables. This probability is the p-value, and if it is less than or equal to the significance level (0.05), the null hypothesis is rejected, indicating a significant association.

**$H_0$.** *The variable "investment in telework" and e-leadership effectiveness are independent.*

The value of significance obtained for the variable investment in telework was $p = 0.288$, which is above the 5% significance level. Therefore, the null hypothesis ($H_0$) is not rejected, indicating no statistical evidence of an association between investment in telework and e-leadership effectiveness. Consequently, these variables are considered statistically independent within the context of this study.

## 5. Discussion

Out of the six formulated hypotheses, three—E-Social, E-Team, and E-Change—were statistically validated. These dimensions demonstrated significant associations with perceptions of e-leadership effectiveness, aligning with existing scientific literature that supports the SEC model.

The E-Social dimension showed the highest significance ($p < 0.001$), indicating that e-leaders who build trust, adapt communication, and provide emotional support are key to effective e-leadership. This competency is particularly important for remote teams facing isolation and low motivation (Van Wart et al., 2017; Salin & Koponen, 2024). The findings suggest e-leaders fostering connection and empathy achieve better outcomes.

The E-Team dimension, associated with the e-leader's ability to build and maintain cohesive and motivated teams, also showed a positive and significant relationship with e-leadership effectiveness ($p = 0.033$). This finding supports Van Wart et al.'s (2017) view that e-leaders must foster a sense of belonging, strengthen each team member's role, and ensure that teamwork is not lost due to physical distance. This challenge is widely recognized in the literature, as authors such as Kempner (2022) also highlight the importance of balancing group cohesion with individual autonomy. E-leadership effectiveness in this context depends on the leader's ability to adapt traditional teamwork practices to digital tools and environments. As emphasized by Wang et al. (2023), effective leaders maintain consistent levels of interaction with their teams, alternating flexibly between face-to-face and digital methods, thus ensuring the continuity of team dynamics. Kempner (2022) reinforces that in digital environments, the challenge of balancing individual autonomy with group belonging requires leaders to demonstrate interpersonal sensitivity and skills.

The E-Change dimension also revealed statistical significance ($p = 0.006$), indicating that the ability to manage change—whether technological, organizational, or procedural—positively contributes to e-leadership effectiveness. This result reinforces Van Wart et al.'s (2017) premise that e-leaders must be proactive in identifying improvements, planning transformations, and overseeing their effective implementation, especially in the constantly evolving digital environment. The rapid technological evolution and continuous digital innovations have challenged e-leaders to develop new ways of solving problems, requiring creativity, continuous learning, and the ability to implement innovative solutions (Kempner, 2022).

In contrast, the E-Tech, E-Communication, and E-Trust dimensions were not statistically significant in the binary logistic regression model.

For E-Tech ($p = 0.054$), the result was close to the threshold of statistical significance, suggesting a possible tendency, although insufficient to confirm the hypothesis. While the literature argues that e-leaders who use ICTs consistently demonstrate more effective e-leadership (Wang et al., 2023) and emphasizes the importance of technological proficiency—including the selection and effective use of digital tools, troubleshooting, and supporting the team's technological needs (Van Wart et al., 2017)—this study indicates that, for the participants surveyed, such competence did not emerge as a determinant of e-leadership effectiveness. A possible explanation may lie in the fact that technological skills are now widely disseminated and expected of any professional, no longer standing out as differentiating factors between effective and less effective e-leaders. Nevertheless, given that the result is very close to the significance threshold, a larger sample could potentially yield a statistically significant result—possibly in a negative direction. This would mean that high levels of E-Tech competence do not necessarily lead to more effective e-leadership. Although seemingly counterintuitive, this finding aligns with literature suggesting that technological skills, while necessary, are not sufficient to guarantee effective leadership in virtual environments (Van Wart et al., 2017).

The E-Communication dimension ($p = 0.138$) was also not significant, even though the literature identifies clear, regular, and bidirectional communication as a pillar of e-leadership (Van Wart et al., 2017). The literature notes that leaders use communication to ensure task completion and maintain positive relationships with their teams (Salin & Koponen, 2024), and it highlights the relationship between communication skills and technological competence (Wang et al., 2023). However, this result may indicate that perceptions of e-leadership effectiveness do not depend solely on communication quality but rather on how communication interacts with other competencies, such as social support, team motivation, or even how ICTs are used to communicate. Given the non-significant results for both E-Communication and E-Tech, this may also reflect digital communication saturation, where excessive or poorly directed communication reduces effectiveness. Kempner (2022) warns about the risks of unbalanced communication in digital contexts, while Hafermalz (2021) notes that e-leaders often attempt to compensate for physical absence through multiple messages—a strategy that may be perceived as micromanagement or generate communication "noise," thereby undermining e-leadership effectiveness.

The non-significance of E-Trust dimension ($p = 0.287$) competence is particularly noteworthy, given its centrality in the SEC model and its prominence in the literature (Van Wart et al., 2017; Wang et al., 2023). One plausible explanation is that trust in virtual environments may not operate as a direct, standalone predictor of leadership effectiveness. Instead, it may function as a mediating or moderating variable, influenced by other factors such as organizational culture, communication climate, or team norms. For instance, in organizations with strong cultures of transparency and psychological safety, trust may be embedded institutionally, reducing the need for leaders to actively cultivate it. Alternatively, trust may emerge as an outcome of other competencies—such as E-Social or E-Communication—rather than as an independent driver. This interpretation aligns with Kempner's (2022) discussion where trust is shaped by broader organizational dynamics and not solely by individual leader behavior. Hence, although trust is theoretically relevant, the current model does not provide sufficient statistical evidence to confirm its direct influence on e-leadership effectiveness. In practical terms, demonstrating competencies such as E-Trust, E-Communication, and E-Tech does not necessarily imply that these have a measurable impact on e-leadership effectiveness.

The results indicate that effective e-leadership in teleworking environments is associated with competencies related to human relations, including establishing authentic connections (E-Social), fostering cohesive teams (E-Team), and leading change with agility (E-Change). The data also suggests that E-Tech competence supports other important skills, such as E-Communication and E-Trust, and this interdependence may explain their limited statistical significance.

Regarding the research question—whether there is an association between the effective e-leader profile and organizational preference for teleworking—Fisher's Exact Test was applied, as previously noted. The significance value obtained ($p = 0.288$) indicates that, at a 5% significance level, there is no statistical evidence of a significant association between the variables analyzed. This suggests that, within the scope of this study, e-leadership effectiveness is not necessarily linked to organizational decisions to invest in teleworking as a preferred model.

Research indicates that adopting teleworking may signal a culture that values innovation, flexibility, and trust within organizations. Eurofound and ILO (2017) found telework linked to autonomy and organizational flexibility. However, this study's data did not show statistically significant evidence for such a relationship. The findings reveal that, for some e-leaders, certain e-leadership competencies appear less pronounced, which aligns with literature indicating that leading remotely remains challenging. As noted by Premuzic (2025) and Pinto (2023), leaders trained in traditional, face-to-face contexts may face difficulties in supervising team performance, maintaining trust, and managing virtual collaboration.

A causal analysis of these findings suggests that while e-leaders can be effective, strategic decisions regarding work models are influenced by other factors—such as economic, cultural, legal, and sectoral ones—that extend beyond e-leadership competencies. Therefore, although this study does not confirm that increased investment in teleworking in Portugal is directly related to e-leadership effectiveness, existing literature indicates that teleworking has been on the rise in recent years (Redação, 2025; Expresso, 2025). This trend may be associated with other factors deserving future research attention, given that teleworking is linked to numerous benefits such as reduced stress, greater work-life balance, increased productivity, shorter commuting times, reduced social contact, and higher control over work patterns (Delfino & van der Kolk, 2021).

Consistent with this theoretical position, the empirical results of this study show that 81.2% of e-leaders reported a significant increase in teleworking practices within their organizations, as shown in Table 11.

**Table 11.** Data | variable Organizational investment in remote work, corresponding to question 7.

| Investment in Telework | Counts | % of Total | Cumulative |
|---|---|---|---|
| Yes, the company has invested significantly more | 59 | 50.4% | 50.4% |
| Yes, but the increase has been modest | 36 | 30.8% | 81.2% |
| I have not noticed any significant changes | 21 | 17.9% | 99.1% |
| On the contrary, there has been a reduction in these investments | 1 | 0.9% | 100.0% |

## 6. Conclusions

### *6.1. Theoretical and Practical Implications*

The present study contributes to the literature on e-leadership by empirically applying the SEC model (Van Wart et al., 2017) to the Portuguese organizational context, with a specific focus on its relationship to telework adoption. By doing so, it offers new insights into how e-leadership competencies manifest in a national setting that has shown a distinct trajectory in embracing remote work.

The findings partially validate the SEC model. Among the six core competencies, E-Social, E-Team, and E-Change were significantly associated with perceived e-leadership effectiveness. These results reinforce the importance of interpersonal, team building, and change management skills in virtual leadership contexts. Conversely, E-Communication, E-Tech, and E-Trust did not show statistically significant associations, suggesting that these competencies may either be baseline expectations in digital environments or operate through indirect mechanisms not captured in the current model.

Importantly, the study found no statistically significant association between e-leadership effectiveness and organizational investment in telework. This indicates that while individual leadership competencies are crucial for managing remote teams, strategic decisions about telework adoption may be influenced more by structural, cultural, or sector-specific factors.

Theoretically, this research supports the adaptability of the SEC model beyond its original context, while also highlighting the need to reconsider the relative weight and interaction of its dimensions. The Portuguese case suggests that some competencies may be more context-sensitive or mediated by organizational culture and digital maturity.

Practically, the validated instrument provides a useful diagnostic tool for assessing and developing e-leadership capabilities. Organizations can leverage these insights to design targeted training programs that prioritize the most impactful competencies for remote leadership success.

### *6.2. Limitations and Future Research*

Despite its contributions, this study also presents certain limitations, accompanied by suggestions for future research. Although the use of questionnaires is widely accepted in empirical and theoretical research (Fachin, 2005; Hair et al., 2005), some limitations are inherent to this method. Given that the questionnaire was administered online, it was not possible to control the conditions under which respondents completed it, which may affect the consistency and reliability of responses. Additionally, subjective interpretation of the questions could have introduced response variability. Furthermore, since this research was conducted within a defined time frame, it does not allow for longitudinal verification of changes that may have occurred after data collection and analysis.

Another limitation concerns the composition of the sample, which consisted predominantly of e-leaders from large organizations (with more than 250 employees), particularly within the technology, communication, and services sectors. This concentration may limit the generalizability of findings to other organizational contexts. Given that e-leadership has been shown to influence organizational competitiveness and digital effectiveness (Hüsing et al., 2013), future studies should apply the SEC model to micro, small, and medium-sized enterprises, as well as to other industries, to better understand how e-competencies manifest and evolve across diverse settings. The SEC framework and the questionnaire developed here can serve as diagnostic and evaluative tools for such future inquiries.

A second limitation lies in the relatively short period during which the survey was active, which, while sufficient for the study's objectives, resulted in a limited number of responses. Future studies are encouraged to apply the same instrument over extended periods and through broader dissemination strategies, enabling larger and more representative samples. Expanding the sample size would allow for more robust analyses and enhance the validity and generalizability of findings, thereby contributing to the consolidation of e-leadership as a field of scientific study.

Finally, a third limitation pertains to the scope of the SEC model itself. In its original formulation, the model identifies six core competencies but does so in a relatively broad manner, focusing primarily on soft skills. Consequently, the questionnaire items reflect this

emphasis, potentially overlooking more specific or technical aspects. Future research could expand upon the SEC model by incorporating additional dimensions or refining existing ones, particularly by integrating hard-skill components. For instance, within the e-tech dimension, future studies could assess proficiency in specific digital tools such as Excel, Power BI, project management software, or collaborative platforms, allowing for a more granular and market-aligned understanding of digital leadership capabilities.

Future research should explore the potential indirect effects by employing structural equation modelling (SEM) or mediation analysis to test whether E-Trust influences leadership effectiveness through its interaction with other competencies or contextual variables such as organizational culture. Additionally, qualitative studies could provide deeper insight into how trust is perceived and built in remote leadership contexts, particularly in cultures with high power distance or collectivist orientations, such as Portugal.

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