Information Management's Influence on Telework Efficiency and Leadership: Perspectives from a Study in Portugal

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Abstract. This paper investigates the impact of information management on telework effectiveness and the role of leadership in facilitating successful telework arrangements within the context of Portuguese organizations. Telework, enabled by advanced information and communication technologies (ICTs), has emerged as a significant alternative work arrangement, particularly in response to global events such as the COVID-19 pandemic. Leveraging data collected from Portuguese firms, this study employs qualitative and quantitative methods to analyze the relationship between information management practices, telework effectiveness, and the leadership strategies employed to support remote work. Findings suggest that effective information management is critical for enhancing telework effectiveness, with leadership playing a pivotal role in facilitating communication, collaboration, and employee well-being in a telework environment. The paper concludes with implications for practice and recommendations for organizations seeking to optimize telework arrangements amidst evolving workplace dynamics.

Keywords: Information management · Telework · Leadership · Remote work · Portugal

1 Introduction

Telework, defined as the practice of working remotely using ICTs, has gained considerable traction in recent years, driven by advancements in technology and

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changing attitudes towards work-life balance. In the wake of the COVID-19 pandemic, organizations worldwide have rapidly adopted telework arrangements to ensure business continuity and employee safety. Portugal, like many other countries, has witnessed a surge in telework adoption, necessitating a closer examination of its implications for organizational effectiveness, leadership practices, and information management.

This study investigates the impact of leadership styles in teleworking environments among employees in Portugal, recognizing the integral role of information management in facilitating successful remote work arrangements. Building upon the growing prevalence of telework, this research aims to explore the interplay between leadership strategies, information management practices, and organizational effectiveness within the Portuguese context. The evolving landscape of telework underscores the need for a holistic approach that integrates leadership, information management, and remote work dynamics to optimize teleworking environments and foster organizational resilience.

2 Literature Review

2.1 Telework and Its Implications for Organizational Effectiveness

Telework is one of the exceptional and somewhat atypical forms of working outside the previously habitual space, although it is gaining increasing prominence in the current economic and social paradigm, with a strong trend towards greater acceptance by workers and preference by organizations in general. With the relative ease with which companies and employees have adapted to new information and communication technologies, telework has been increasingly seen not only as a possibility for the continued performance of many functions but also as a new contractual form in which workers fulfill their obligations from any external point, whether in their own home (home office or home-based work) or in another location where an internet connection permits it [2].

The origin of the Portuguese word "teletrabalho" correspondent to the English word telework comes from the Greek expression "telou", which means "far from" or "at a distance", and the Latin word "tripaliare", which means "to work", resulting in the combination meaning "remote work". The nature of this work depends on the contractual typology agreed upon between employer and employee [7]. According to [8], the reason why we generally do not use the term "telecommuting", as used in the US, is because in the main European languages - Spanish, French, German, Italian, Portuguese - there is no term or expression equivalent to the English word "commuting", which means "going to and from work", hence the term "telecommuting". In this sense, the closest expression in our language would indeed be "telework".

Commonly, [2] shares the understanding that there are indeed some benefits for organizations, workers, and societies. However, there are also risks, particularly regarding the individualization of work, specifically the risk of professional, political, and social isolation by workers. Anker [1] suggests that organizations, on the other hand, seeks alternatives to optimize work in order to improve the

quality of life of workers, reducing the stress that existed when they returned from their usual workplace to their homes. Following this line of thought, [17] also agrees that workers can experience positive effects on health due to the reduction of stress, resulting in an improved balance between work and family. Further, it is crucial for a better quality of life and social sustainability when there is a more effective balance in the use of time between the worker's daily life and teleworking.

Regarding negative aspects, [5], in their analysis of public sector employees teleworking, concluded that those working from home show a more pronounced professional and less organizational isolation. These authors also mention that leadership styles in the hierarchy are not as suitable as in other teams and organizations due to their high degree of virtuality, as communication is less formal and hierarchical. It is worth noting that, based on the lack of personal contact and geographical dispersion, leaders also face greater difficulty in adopting traditionally used behaviors. DeVries [5] believes that, in teleworking, empathy and support from colleagues may no longer be available. Additionally, it may be necessary for workers (subordinates) to require greater monitoring from their respective leaders. From another perspective, despite public sector employees feeling good and committed to the employer when present in person, their sense of commitment may significantly decrease on days when they have to work from home.

2.2 Information Management in Telework Environments

In recent years, the landscape of work has evolved dramatically, with telework becoming increasingly prevalent, especially in response to technological advancements and global events such as the COVID-19 pandemic [15]. As organizations adapt to remote work arrangements, the management of information has become a critical aspect of ensuring productivity, collaboration, and data security in telework environments [13]. In telework environments, the efficient management of information is paramount to maintaining organizational cohesion and achieving strategic objectives. Caraiani [3] suggests that effective information management in telework settings requires a comprehensive understanding of the three fundamental levels of management: administration, management, and operations. Top managers, responsible for institutional management, must devise strategies to facilitate remote collaboration, establish clear communication channels, and ensure that remote workers have access to the necessary resources and support systems.

Middle managers play a crucial role in adapting organizational policies and strategies to the unique challenges of telework environments. They are tasked with coordinating remote teams, fostering a sense of belonging and accountability among teleworkers, and addressing any issues that may arise in the course of remote operations [3]. At the operational level, first-line managers oversee the day-to-day activities of remote workers, ensuring that tasks are completed efficiently and in line with organizational objectives. They must implement systems for monitoring and evaluating remote performance, provide remote workers

with the necessary training and support, and facilitate effective communication between remote teams [3].

Effective information management in telework environments also requires the implementation of appropriate technological solutions and security measures. Kuruzovich [12] emphasizes the importance of leveraging technology to enable remote collaboration, streamline workflows, and protect sensitive information from unauthorized access or data breaches. Moreover, ethical considerations, promoting a culture of trust, transparency, and accountability among remote workers, as well as addressing any ethical dilemmas or conflicts that may arise in the course of remote operations and cultural factors play a significant role in information management in telework environments.

In conclusion, information management in telework environments is a multifaceted process that requires careful planning, coordination, and adaptation to the unique challenges of remote work. By leveraging technology, fostering a culture of trust and transparency, and implementing appropriate security measures, organizations can effectively manage information in telework environments and ensure the success of remote operations.

2.3 Leadership Roles and Strategies in Facilitating Telework Effectiveness

In the context of contemporary organizational management, teamwork and leadership play pivotal roles in navigating the complexities of telework environments. Zamanov [19] asserts that effective team management within an organization involves coordinating and directing relationships among workers, with a focus on recognizing the value and relevance of each individual. This is particularly pertinent as organizations transition away from traditional hierarchical structures towards more collaborative and dynamic team-based approaches. Some authors distinguishes between mere groups of individuals and cohesive teams, emphasizing the importance of shared goals, complementary skills, and coordinated efforts in achieving common objectives. A key aspect of team dynamics, as highlighted, is the continuous exchange of feedback among team members. Leaders, therefore, must not only facilitate feedback mechanisms but also establish clear, achievable goals, conduct regular meetings to ensure alignment, and foster a supportive and inclusive team culture (see, for instance, [3]).

Furthermore, the composition of effective teams extends beyond innate characteristics to include behavioural competencies and technical skills. These authors delineate the defining characteristics of teams, emphasizing social interaction, shared goals, task interdependence, and integration within the broader organizational context. This interconnectedness underscores the importance of effective leadership in facilitating collaboration and coordination among team members. Leadership, as elucidated by [9], is a timeless concept that transcends historical epochs, encompassing the ability to influence and inspire individuals or groups towards common goals. It elaborates on the multifaceted nature of leadership, encompassing interpersonal attitudes and behaviors that shape

organizational culture and dynamics. Effective leadership involves not only influencing behaviors but also fostering a supportive and empowering environment conducive to individual and collective growth [3].

Despite the historical evolution of leadership theories, the significance of effective leadership in organizational success remains unequivocal. From trait-based theories to contemporary contingency and value-based approaches, leadership research continues to evolve, reflecting changing organizational landscapes and the complexities of human behavior. In the modern context, leadership extends beyond individual traits to encompass team dynamics and organizational effectiveness. Leaders must balance individual capabilities with collective performance, fostering collaboration, innovation, and resilience within their teams [6]. This requires emotional intelligence, empathy, and the ability to empower and motivate others towards shared objectives.

Ultimately, effective leadership in telework environments hinges on the ability to adapt to changing circumstances, foster collaboration, and empower individuals and teams to thrive in virtual settings. By embracing inclusive leadership practices, promoting open communication, and nurturing a culture of trust and accountability, leaders can facilitate telework effectiveness and drive organizational success [6]. These authors advance that effective leadership entails adopting behaviors that garner recognition and respect from subordinates, as this is pivotal to achieving desired outcomes. Emphasizing the importance of emotional intelligence, leaders must exert control over not only their own emotions but also those of their team members. By setting an example and delegating tasks while maintaining oversight, leaders can cultivate an environment of fairness and impartiality, thereby fostering team mobilization and achieving organizational success.

2.4 The Portuguese Context of Telework Adoption and Its Challenges

Coenen [4] highlights that while telework is often associated with working from home, its true definition pertains to task execution "outside the employer's premises", allowing for work to be conducted remotely with the aid of technology and communication equipment. Although commonly perceived as home-based work, telework encompasses diverse forms, including telecentres, satellite centres, and mobile telework, as described by [18]. According to [17], telecentres serve as shared resource centers where equipment, either owned or rented, is utilized by users from various companies. Similarly, satellite centers, located near users' residences, provide flexible spaces for remote collaboration, often adopting a coworking model. Coworking, involves work conducted outside the headquarters of the parent company, typically in its subsidiaries situated across different geographic locations but connected through ICT. This telework modality is predominantly adopted by large corporations in urban centers.

Mobile telework, as outlined by [17], involves work conducted from various locations using portable equipment such as laptops or mobile devices with wireless telecommunications capabilities [11]. In addition to geographical and phys-

ical distinctions, telework modalities encompass factors such as the proportion of work performed remotely, categorized as full-time, part-time, or ad hoc, as discussed by [17]. Furthermore, telework arrangements vary based on the employment relationship, with some individuals working exclusively for one employer from their residence while others, freelancers, may serve multiple clients, necessitating various employer relationships.

Additionally, telework may differ based on the timing of work, occurring during regular daytime hours, evenings, or weekends, serving as a means to compensate for tasks that cannot be completed during regular working hours as cited in [17].

2.5 Barriers to Telework Adoption

Despite its potential benefits, telework faces several barriers that hinder its adoption and effectiveness. Challenges include limited internet access, particularly in geographically remote areas, where telecommunication infrastructure may not meet the required standards. Additionally, organizational barriers such as limited access to company information through electronic devices and resistance to technological investments and cultural changes pose significant obstacles [19]. Other barriers include the necessity for physical presence in the workplace, computer illiteracy among employees, resistance to telework, reluctance of companies to invest in technology, concerns regarding loss of control over employees, and the desire to maintain a clear separation between personal and professional life.

Moreover, interpersonal interaction among colleagues may be limited, further complicating collaborative efforts. Given the demanding nature of telework, individuals must possess specific characteristics to succeed in this environment, such as self-motivation, proficiency in their work, independence, time management skills, comfort with solitude, reliability, and trustworthiness [17]. However, despite its potential, telework still faces challenges that necessitate further research, as findings regarding its impact remain inconclusive. While some studies suggest positive outcomes for teleworkers, others indicate potential drawbacks, such as decreased personal and familial satisfaction, highlighting the need for comprehensive investigations into telework's implications (see, e.g., [2]).

2.6 Research Question

Understanding the diverse modalities and inherent challenges of telework within the Portuguese context lays the foundation for investigating its efficiency in organizational settings. With telework encompassing various forms, including home-based, satellite centers, and mobile arrangements, it becomes crucial to explore how information management influences its efficacy. Moreover, organizational barriers such as limited access to company information, technological resistance, and concerns regarding control over employees highlight the need to assess the impact of information management on telework practices. Furthermore, examining leadership strategies in facilitating telework effectiveness becomes imperative,

considering the importance of leaders in fostering a conducive remote work environment. Therefore, the research question "How does information management influence the efficiency of telework practices and leadership strategies within Portuguese organizations?" emerges as a pivotal inquiry, aiming to uncover the interplay between information management, telework efficiency, and leadership approaches in the Portuguese organizational landscape.

3 Methodology

3.1 Data Collection

The research was conducted across mainland Portugal and the archipelagos of the Azores and Madeira, aiming to reach a broad spectrum of individuals regardless of their sector of activity or type of service. It was acknowledged from the outset that certain activities, such as repair workshops, assembly lines, construction, security, emergency services, and distribution, might not lend themselves to non-presential work. Therefore, the choice to distribute questionnaires via email was deemed the most suitable method considering the national scope and the number of individuals targeted. Overall, the contribution of respondents, varying in quantity, took shape thanks to their willingness to participate and, notably, the cooperation of many employers, which was crucial for the intended purposes.

Quantitative Approach: As previously mentioned, this study solely adopted a quantitative methodology. According to [6], this type of analysis tends to focus on how a variation in X may also cause a variation in Y, although the cause-and-effect relationship may not always be evident. To fulfil the objectives of this research, following the decision to employ a quantitative approach, a questionnaire was developed, encompassing the attributes and constructs under analysis, namely, the quality of life in telework, the interaction/relationship with boss/hierarchical superior in telework context, the perception of leadership style of boss/hierarchical superior towards oneself in telework, sociodemographic and professional data. The previous first three constructs were measured using fifteen questions with possible answers classified with a five points Likert scale. The last ones related with sociodemographic and professional data were of nominal type.

3.2 Sampling Strategy and Participant Demographics

The sample size calculation for this study was obtained using the software developed by [16], available online on the "Prática Clínica" webpage, resulting in 620 responses recorded for a minimum sample of 385 respondents, based on a 95% confidence interval and a 5% margin of error. Although a sample of 385 workers would have been sufficient according to the criteria defined in this software, a larger number was ultimately utilized, thereby enhancing the precision of the results obtained. The present survey targeted the entire active population working as employees in Portugal. According to data from Pordata (2023), based on the latest census in 2021, the total number of these workers was 3 435 002.

3.3 Data Analysis Techniques

Once the deadline for responses to the questionnaire was reached, the data were exported directly from Google Forms to Google Sheets, then transferred, saved, and processed in a Microsoft Excel file before being exported to IBM SPSS (Statistical Package for the Social Sciences) software for analysis. Statistical analysis was conducted to treat the data.

To characterize the sample, descriptive statistical techniques were employed, including vertical and horizontal bar charts, pie charts, absolute frequency tables (number of individuals) and relative frequency tables (percentages of individuals), mean, median, mode, standard deviation, maximums, and minimums. Quality assessment of the database was prioritized, and an anomalous situation of missing cases was identified. It was discovered that a line duplication occurred in the Microsoft Excel file, which had been created but interrupted midway, resulting in 621 respondents instead of the actual 620 received. This duplication, and particularly its inconsistency, was corrected, resulting in the accurate count of 620 received responses. Following [10], outliers were analyzed, and item sensitivity was studied using skewness coefficients ($|Sk| \leq 3$) and kurtosis ($|Ku| \leq 10$). The assumption of normality of items was verified. Otherwise, a severe violation of the normality assumption would be indicated.

To analyze the measures of Quality of life in telework, Interaction/relationship with boss/hierarchical superior in telework context, and Perception of leadership style of boss/hierarchical superior towards oneself in telework context, arithmetic means and standard deviations were calculated for each item of the 3 variables. The arithmetic mean (M) is the sum of all values in a given dataset divided by the number of elements in that dataset. The median (Md) is the smallest value of the variable up to which at least 50% of the observations accumulate. Considering each variable consists of an even number (620) of answers, which must be arranged in ascending or descending order beforehand, the median value for each of the 15 questions represents the central value of the dataset. Standard deviation (SD) is a measure that expresses the degree of dispersion of a dataset, indicating how uniform the data are. The closer the standard deviation is to 0 (zero), the more homogeneous the data are [14].

The Kaiser-Meyer-Olkin (KMO) statistic is calculated to verify the strength of partial correlation between the various variables under study, providing the adequacy of the input matrix. According to [14], KMO values close to 1.0 are considered ideal, while values below 0.5 are unacceptable. Most scholars argue that a KMO measure of at least 0.80 is good enough to start factor analysis. The Bartlett's Test of Sphericity is used to assess the null hypothesis that the correlation matrix reflects an identity matrix, implying that the variables are uncorrelated and thus unsuitable for factor analysis. However, to achieve an identity matrix, a significant test should assume minimum significance levels above 0.05. Factor Analysis using the Principal Components method, and Varimax with Kaiser Normalization as rotation method, was employed to determine the value of each construct. To validate the appropriateness of these data, the correlation coefficient was calculated using the KMO measure and Bartlett's

Test of Sphericity. Reference values for this scale, which serve as indicators of whether factor analysis is appropriate or not, may vary among authors. However, the most suitable fit in a factor analysis model should have a KMO value above 0.8. Based on [14] recommendations, values below 0.5 are unacceptable, between 0.5 and 0.6 are poor, between 0.6 and 0.7 are mediocre, between 0.7 and 0.8 are fair, between 0.8 and 0.9 are good, and between 0.9 and 1 are excellent.

In the field of Social Sciences, attempts are often made to measure phenomena that cannot be directly observed, referred to as constructs or latent variables. These variables are deduced mathematically from other variables that can be directly observed, i.e., that can be measured directly [14].

4 Findings

4.1 Impact of Information Management Practices on Telework Effectiveness

Understanding the demographics and professional backgrounds of respondents is crucial to discern the impact of information management practices on telework effectiveness. In terms of demographics, the sample of 620 respondents was predominantly female, comprising 71.77% (n = 445), which may be attributed to the pandemic's demands, where women often assumed primary caregiving responsibilities, potentially influencing their inclination towards telework. Regarding age distribution, a significant proportion (44.19%, n = 274) fell within the 41–50 age group, while those aged 16–30 represented only 8.39% (n = 52). Educational attainment revealed that 65.48% (n = 406) possessed a higher education degree, underscoring the sample's educational profile. Marital status data indicated that 65.65% (n = 407) of respondents were married. Household composition revealed diverse structures, with 31.13% (n = 193) having three-person households and 27.26% (n = 169) having four-person households, reflecting varying family dynamics among respondents. Professionally, the majority (76.61%, n = 475) worked in the public sector, predominantly in public administration (65.97%, n = 409). Regarding company size, 45.81% (n = 284) reported organizations with over 250 employees, highlighting the prevalence of larger establishments in the sample. Longevity in current employment varied, with 34.35% (n = 213) having over 20 years of service, while 26.94% (n = 167) had been with their current employer for less than 5 years. The majority (76.13%, n = 472) did not hold managerial positions. Telework practices showcased a significant adaptation during the pandemic, with 62.58% (n = 388) teleworking full-time. Preferences for telework arrangements revealed that 49.19% (n = 305) favoured a hybrid model, combining remote and in-person work, while 41.29% (n = 256) preferred working solely at the company's physical premises. Flexibility in working hours was notable, with 43.39% (n = 269) reporting flexible schedules.

In summary, it was possible to notice that the sample's composition reflects diverse demographic and professional backgrounds, with notable trends towards

telework adoption, particularly during the pandemic. Gender Disparity and Telework: the significant majority of female respondents (71.77%) suggests a potential gender disparity in telework participation, possibly influenced by caregiving responsibilities during the pandemic. This highlights the need for gender-inclusive telework policies to ensure equitable opportunities for all employees. Age Distribution and Telework Adoption: the higher proportion of respondents aged 41–50 (44.19%) compared to younger age groups indicates a greater propensity for telework adoption among mid-career professionals. This suggests that telework may be more prevalent among established professionals with greater flexibility in their roles. Educational Attainment and Telework Readiness: the majority of respondents (65.48%) holding a higher education degree may indicate a correlation between educational attainment and telework readiness ($r = 0.156,\ p < 0.001$). Higher-educated individuals may possess the skills and resources necessary for remote work, potentially impacting telework effectiveness and productivity. Company Size and Telework Implementation: the prevalence of respondents working in organizations with over 250 employees (45.81%) underscores the importance of organizational size in facilitating telework arrangements. Larger companies may have the resources and infrastructure to support remote work, impacting the scalability and effectiveness of telework initiatives.

Telework Preferences and Work Arrangements: the preference for a hybrid telework model (49.19%) suggests a growing demand for flexibility in work arrangements, allowing employees to balance remote and in-person work. This preference may impact organizational policies and infrastructure to accommodate hybrid work models effectively. Flexible Working Hours and Employee Satisfaction: the significant proportion of respondents (43.39%) reporting flexible working hours highlights the importance of autonomy and work-life balance in telework arrangements. Flexibility in working hours can positively impact employee satisfaction, productivity, and overall telework effectiveness. Managerial Positions and Telework Leadership: the majority of respondents (76.13%) not holding managerial positions may influence telework leadership and supervision practices. Effective telework leadership is crucial for fostering collaboration, communication, and accountability in remote teams, potentially impacting telework effectiveness and team performance. Overall, the analysis underscores the multifaceted nature of telework adoption and its implications for organizational policies, employee demographics, and work arrangements. Understanding these dynamics is essential for designing effective telework strategies that promote productivity, employee well-being, and organizational success.

In what follows, we present some results of the factor analysis that were performed. Factor analysis of the construct Quality of life in telework (15 items): KMO = 0.897, and the Bartlett's test of sphericity was highly significant ($\chi^2_{(105)} = 2903.97,\ p < 0.001$), confirming that the data were suitable for factor analysis. Four items with communalities lower than 0.5 were removed. This construct was found to be unidimensional, explaining 43.81% of the total variance, and the 11 items retained showed good internal consistency with a Cronbach's

alpha value of 0.868. Factor analysis of the construct Interaction/relationship with boss/hierarchical superior in telework context (15 items): KMO = 0.894, and a significant Bartlett's test of sphericity ($\chi^2_{(105)} = 3989.76,\ p < 0.001$). Two items with communalities lower than 0.5 were eliminated and 2 factors were retained, which together explain 58.27% of the total variance. The first factor, called Development, explains 39.67%, and the second, called Integration, 18.60% of the variance. The Cronbach's alpha reliability values obtained were, respectively, 0.899 and 0.684. Factor analysis of the construct Perception of leadership style of boss/hierarchical superior towards oneself in telework: KMO = 0.965, and a significant Bartlett's test of sphericity ($\chi^2_{(105)} = 8119.66,\ p < 0.001$). This construct was found to be unidimensional, explaining 63.69% of the total variance, and the 15 items showed good internal consistency with a Cronbach's alpha value of 0.94.

4.2 Leadership Strategies Conducive to Successful Telework Arrangements

The study provides valuable insights into the characteristics of the sample population participating in telework arrangements, which can be linked to leadership strategies conducive to successful telework arrangements as follows. Gender Disparity and Inclusive Leadership: the observation of a significant majority of female respondents engaging in telework highlights the importance of inclusive leadership strategies. Effective leaders must recognize and address potential gender disparities in telework participation by implementing policies that promote equal opportunities and support for all employees, irrespective of gender. Age Distribution and Leadership Adaptability: the higher representation of mid-career professionals in telework suggests the need for leadership adaptability to cater to diverse age groups. Leaders should tailor communication styles, performance management approaches, and support mechanisms to accommodate the preferences and needs of employees across different age demographics, ensuring successful telework implementation. Educational Attainment and Leadership Development: the correlation between higher educational attainment and telework readiness underscores the role of leadership development in facilitating remote work effectiveness. Leaders must invest in training and development initiatives to equip employees with the necessary skills, competencies, and technological proficiency required for successful telework arrangements. Company Size and Leadership Support: the prevalence of telework among employees in larger organizations highlights the importance of leadership support and organizational resources. Effective leaders in larger companies must provide strategic direction, allocate resources, and establish clear policies to enable seamless telework implementation, fostering a supportive work environment conducive to remote collaboration and productivity.

Telework Preferences and Transformational Leadership: the preference for hybrid telework models indicates the need for transformational leadership strategies that promote flexibility, innovation, and employee empowerment. Transformational leaders inspire trust, encourage autonomy, and facilitate continuous

adaptation to changing work arrangements, driving organizational resilience and agility in the face of uncertainty. Flexible Working Hours and Leadership Trust: the provision of flexible working hours underscores the significance of leadership trust in telework arrangements. Trustworthy leaders foster a culture of autonomy, accountability, and mutual respect, empowering employees to manage their time effectively and deliver results, regardless of physical location. Managerial Positions and Leadership Communication: the distribution of managerial positions among teleworkers emphasizes the importance of effective leadership communication. Leaders in telework environments must prioritize transparent communication, regular feedback, and active engagement to overcome challenges associated with remote supervision, ensuring clarity of expectations and alignment of goals across distributed teams. Overall, the study highlights the intersection between leadership strategies and the characteristics of the telework population, emphasizing the importance of inclusive, adaptable, supportive, and communicative leadership practices in facilitating successful telework arrangements.

4.3 Challenges and Opportunities Specific to the Portuguese Context

In the context of Portugal, the implementation of telework presents both challenges and opportunities that require careful consideration and effective leadership strategies to navigate successfully. Gender Disparity and Inclusive Leadership: a notable gender disparity in telework participation may reflect existing societal norms and caregiving responsibilities. Effective leadership should promote inclusive practices that address gender imbalances, ensuring equitable access to telework opportunities and support for all employees, regardless of gender. By fostering a culture of diversity and inclusion, leaders can harness the full potential of their workforce and promote gender equality in telework arrangements.

Age Distribution and Leadership Adaptability: Portugal's workforce comprises individuals spanning various age demographics, each with unique preferences and needs regarding telework. Leaders must adopt adaptable leadership styles that cater to diverse age groups, providing tailored support, training, and resources to accommodate employees at different stages of their careers. By embracing flexibility and embracing generational diversity, leaders can enhance employee engagement and productivity in telework environments. Educational Attainment and Leadership Development: disparities in educational attainment levels among teleworkers highlight the importance of leadership development initiatives. Effective leaders should invest in continuous learning opportunities, providing employees with the skills, knowledge, and technological proficiency required for successful telework. By prioritizing training and upskilling programs, leaders can empower their workforce to adapt to remote work challenges and drive organizational innovation and competitiveness.

Company Size and Leadership Support: in Portugal, organizations of varying sizes may face distinct challenges in implementing telework. Leaders in larger companies must provide strategic direction, allocate resources, and establish

clear policies to support telework initiatives effectively. Meanwhile, leaders in smaller enterprises may need to prioritize resource allocation and foster a supportive organizational culture conducive to remote collaboration and flexibility. By providing leadership support tailored to their organization's size and structure, leaders can mitigate barriers to telework adoption and promote organizational resilience. Telework Preferences and Transformational Leadership: the preference for hybrid telework models underscores the need for transformational leadership that promotes flexibility and innovation. Forward-thinking leaders should inspire trust, empower autonomy, and encourage continuous adaptation to changing work arrangements. By embracing transformational leadership principles, leaders can create an agile and adaptive organizational culture that maximizes the benefits of telework while fostering employee well-being and satisfaction.

Flexible Working Hours and Leadership Trust: flexible working hours require leaders to cultivate trust and accountability within their teams. Trustworthy leaders should foster open communication, provide clear expectations, and empower employees to manage their time effectively. By prioritizing transparency and mutual respect, leaders can build strong relationships with their remote teams, promoting collaboration, and driving performance in telework environments. Managerial Positions and Leadership Communication: effective leadership communication is essential for overcoming the challenges of remote supervision and fostering employee engagement. Leaders must leverage digital communication tools to facilitate regular feedback, provide guidance, and maintain team cohesion. By fostering a culture of open communication and collaboration, leaders can overcome barriers to remote supervision and ensure alignment of goals and objectives across distributed teams.

In conclusion, the Portuguese context presents unique challenges and opportunities for telework implementation, requiring leaders to adopt inclusive, adaptable, and communicative leadership strategies. By addressing gender disparities, embracing generational diversity, investing in leadership development, providing support tailored to organizational size, promoting flexibility and innovation, fostering trust and accountability, and prioritizing effective communication, leaders can navigate the complexities of telework and unlock its full potential for organizational success and employee well-being in Portugal.

5 Discussion

5.1 The Interplay Between Information Management, Telework Effectiveness, and Leadership

The interplay between information management, telework effectiveness, and leadership is multifaceted and dynamic, encompassing various challenges and opportunities within the Portuguese context. Gender disparities in telework participation underscore the importance of inclusive leadership strategies that promote gender equality and diversity. Age distribution highlights the need for adaptable leadership approaches that cater to the preferences and needs

of employees across different generations. Disparities in educational attainment underscore the significance of leadership development initiatives to equip teleworkers with the necessary skills and technological proficiency. Company size influences the leadership support required for successful telework implementation, with leaders needing to tailor their approaches to the organizational structure and resources available. Telework preferences, such as hybrid models, call for transformational leadership that fosters flexibility, innovation, and trust. Flexible working hours necessitate leadership that cultivates trust and accountability, while managerial positions require effective communication strategies to overcome the challenges of remote supervision. By addressing these aspects and adopting inclusive, adaptable, and communicative leadership strategies, organizations in Portugal can optimize the interplay between information management, telework effectiveness, and leadership to drive success and employee well-being in remote work environments.

5.2 Implications for Organizational Policy and Practice

The implications for organizational policy and practice stemming from the interplay between information management, telework effectiveness, and leadership are multifaceted and critical for the success of modern workplaces, particularly in the Portuguese context. Policy Development: organizations need to develop comprehensive telework policies that address various aspects of remote work, including communication protocols, performance expectations, data security measures, and employee well-being initiatives. These policies should be flexible enough to accommodate the diverse needs of employees while ensuring alignment with organizational goals and values. Technology Integration: to support effective telework, organizations must invest in and integrate appropriate technology infrastructure and digital tools. This includes cloud-based collaboration platforms, project management software, cybersecurity solutions, and remote access systems. Policies should outline guidelines for the use of these technologies and ensure compliance with data protection regulations.

Leadership Training: organizations should provide leadership training programs tailored to remote management. Leaders need to develop skills in virtual communication, team motivation, conflict resolution, and performance evaluation. Emphasis should be placed on fostering a supportive and inclusive work culture that transcends physical boundaries. Performance Evaluation: traditional performance evaluation methods may need to be adapted to suit remote work environments. Organizations should explore outcome-based performance metrics rather than relying solely on input-based measures. Regular feedback sessions and goal-setting exercises can help employees stay aligned with organizational objectives and track their progress effectively.

Employee Engagement: maintaining high levels of employee engagement in remote settings requires proactive efforts from organizational leaders. Regular virtual team meetings, social events, and recognition programs can help foster a sense of belonging and camaraderie among remote workers. Organizations should

also provide channels for employees to voice their concerns and feedback. Work-Life Balance: telework policies should promote work-life balance by establishing clear boundaries between work hours and personal time. Encouraging employees to take regular breaks, set realistic workloads, and disconnect after hours can help prevent burnout and improve overall well-being.

Data Security Measures: with the increase in remote work, organizations must priorities data security and privacy. This includes implementing robust cybersecurity protocols, encryption technologies, and access controls to protect sensitive information from cyber threats. Employee training on data security best practices is also essential to mitigate risks. Cultural Adaptation: organizations need to adapt their organizational culture to embrace remote work as a viable and sustainable model. This may involve fostering a culture of trust, autonomy, and accountability, where employees are empowered to manage their work independently. Leaders should lead by example and demonstrate a commitment to remote work practices.

5.3 Recommendations for Fostering Effective Telework Environments in Portugal

To foster effective, telework environments in Portugal, several recommendations can be proposed based on the interplay between information management, telework effectiveness, and leadership, as follows. Invest in Infrastructure: organizations should invest in robust technological infrastructure to support remote work, ensuring reliable access to digital tools and platforms for communication, collaboration, and information management. Promote Leadership Development: develop leadership programs focused on remote management skills, such as effective communication, team collaboration, and performance management in virtual settings. Leaders should be equipped with the necessary skills to motivate and support remote teams effectively. Implement Flexible Policies: establish flexible telework policies that accommodate diverse employee needs and preferences. Provide options for hybrid work arrangements, allowing employees to balance remote and on-site work based on their roles and responsibilities.

Enhance Digital Literacy: offer training programs to enhance employees' digital literacy skills, including proficiency in remote communication tools, cybersecurity practices, and information management techniques. Ensure that all employees have the necessary skills to navigate virtual work environments effectively. Prioritize Well-being: prioritize employee well-being by promoting work-life balance, setting clear boundaries between work and personal life, and offering mental health support resources. Encourage regular breaks, social interactions, and opportunities for physical activity to mitigate the challenges of remote work. Facilitate Communication: foster open and transparent communication channels between remote teams and leadership. Encourage regular check-ins, team meetings, and one-on-one discussions to maintain connection and alignment across the organization. Promote Collaboration: implement collaborative tools and platforms to facilitate teamwork, knowledge sharing, and project management in virtual environments. Encourage cross-functional collaboration and

team-building activities to foster a sense of belonging and camaraderie among remote employees. Ensure Data Security: prioritize data security and privacy measures to protect sensitive information in remote work settings. Implement robust cybersecurity protocols, data encryption techniques, and access controls to safeguard organizational data from potential threats and breaches.

Monitor Performance: establish clear performance metrics and goals for remote employees, regularly monitor progress, and provide constructive feedback and recognition for achievements. Implement performance management systems that focus on outcomes rather than hours worked to evaluate telework effectiveness. Adapt Organizational Culture: adapt the organizational culture to embrace remote work as a viable and sustainable model for the future. Promote a culture of trust, autonomy, and accountability, where employees feel empowered to take ownership of their work and contribute to the organization's success, regardless of their location. By implementing these recommendations, organizations in Portugal can create supportive and effective telework environments that enhance productivity, engagement, and overall organizational performance.

6 Conclusion

6.1 Summary of Key Findings

This study has shed light on the complex interplay between information management practices, telework effectiveness, and leadership strategies, particularly within the Portuguese context. Through an analysis of sociodemographic characteristics, professional profiles, and telework arrangements of respondents, several key findings have emerged. The sociodemographic characterization revealed a predominance of female respondents, with a significant proportion belonging to the age group of 41–50 years and holding higher education qualifications. Furthermore, a majority of respondents were married and had households with an average size of three people. From a professional standpoint, the majority of respondents were employed in the public sector, particularly in administrative roles. The duration of employment with their current employers varied, with a significant portion having more than 20 years of service. Additionally, most respondents did not hold managerial positions, and the prevalence of telework was evident, with a majority teleworking the entire week from their homes.

These findings underscore the importance of comprehensive telework policies, tailored leadership training programs, and robust technology infrastructure to support remote work initiatives. Organizations must also prioritize employee engagement, well-being, and data security to foster effective telework environments. Moving forward, it is essential for organizations in Portugal to adapt their policies and practices to accommodate the evolving nature of remote work. By embracing flexibility, technology, and inclusive leadership strategies, organizations can navigate the challenges and leverage the opportunities presented by telework to drive productivity, innovation, and organizational success.

6.2 Limitations and Avenues for Future Research

While this study provides valuable insights into the interplay between information management practices, telework effectiveness, and leadership strategies within the Portuguese context, some limitation existed: Given the extensive national scope of the population under investigation, obtaining consent from all employers proved challenging, particularly considering that the study was not centered in their geographical regions and not directly linked to the specific companies in question. The study's focus on Portugal also restricts generalizability, while overlooking organizational and managerial perspectives on telework. Future research should employ longitudinal and comparative approaches, incorporate objective metrics, and explore emerging technologies to address these limitations and foster effective telework environments globally.

6.3 Closing Remarks on the Significance of Information Management and Leadership in Enhancing Telework Effectiveness

In conclusion, this study underscores the pivotal role of information management and leadership in augmenting the effectiveness of telework arrangements, particularly within the unique context of Portugal. Through an extensive analysis of sociodemographic characteristics and professional profiles, it becomes evident that successful telework implementation hinges upon robust information management practices and adept leadership strategies. The findings highlight the intricate interplay between these factors and telework effectiveness, shedding light on the challenges and opportunities specific to the Portuguese landscape. As organizations navigate the evolving telework landscape, it is imperative for them to recognize the implications for policy and practice, integrating recommendations for fostering effective telework environments. Despite the limitations inherent in the study, such as the difficulty in obtaining consent from all employers within the national coverage, the insights gleaned pave the way for future research avenues. Moving forward, leveraging these insights can inform organizational policies and practices, ultimately driving towards more efficient and sustainable telework arrangements in Portugal and beyond.

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References

1. Anker, T.: At the boundary: post-COVID agenda for business and management research in Europe and beyond. Eur. Manag. J. **39**(2), 171–178 (2021). https://doi.org/10.1016/j.emj.2021.01.003
2. Blahopoulou, J., Ortiz-Bonnin, S., Montañez-Juan, M., Espinosa, G., García-Buades, M.: Telework satisfaction, wellbeing and performance in the digital era. Lessons learned during COVID-19 lockdown in Spain. Curr. Psychol. **41**(5), 2507–2520 (2022). https://doi.org/10.1007/s12144-022-02873-x
3. Caraiani, C., Lungu, C., Dascalu, C., Stoian, C.: The impact of telework on organisational performance, behaviour, and culture: evidence from business services industry based on employees' perceptions. Econ. Res.-Ekonomska Istraživanja **36**(2), 2142815 (2023). https://doi.org/10.1080/1331677X.2022.2142815
4. Coenen, M., Kok, R.: Workplace flexibility and new product development performance: the role of telework and flexible work schedules. Eur. Manag. J. **32**(4), 564–576 (2014). https://doi.org/10.1016/j.emj.2013.12.003
5. DeVries, H., Tummers, L., Bekkers, V.: The benefits of teleworking in the public sector: reality or rhetoric? Rev. Public Pers. Adm. **39**(4), 570–593 (2019). https://doi.org/10.1177/0734371X18760124
6. Farinha, J., Ascenso, L.: Telework as an element that leverages professional performance and family balance. In: Challenges for Human Resource management in the Covid-19 era, pp. 187–207 (2022). https://doi.org/10.4018/978-1-7998-9840-5.ch010
7. Golden, T.: Applying technology to work: toward a better understanding of telework. Organ. Manag. J. **6**(4), 241–250 (2009). https://doi.org/10.1057/omj.2009.33
8. Golden, T., Gajendran, R.: Unpacking the role of a telecommuter's job in their performance: examining job complexity, problem solving, interdependence, and social support. J. Bus. Psychol. **34**, 1–15 (2019). https://doi.org/10.1007/s10869-018-9530-4
9. Keles, N.: Leadership, Leadership Styles and Leadership in Public Administration Special of Turkish Customs Administrations (2022). https://doi.org/10.52848/ijls.1070904
10. Kline, R.: Principles and Practice of Structural Equation Modeling, 4th edn. The Guilford Press, New York (2016)
11. Korkeakunnas, T., Heiden, M., Lohela-Karlsson, M., Rambaree, K.: Managers' perceptions of telework in relation to work environment and performance. Sustainability **15**, 5845 (2023). https://doi.org/10.3390/su15075845
12. Kuruzovich, J., Paczkowski, W., Golden, T., Goodarzi, S., Venkatesh, V.: Telecommuting and job outcomes: a moderated mediation model of system use, software quality, and social exchange. Inf. Manag. **58**(3), 103431 (2021). https://doi.org/10.1016/j.im.2021.103431
13. Luo, B., Sun, T., Lin, C., Luo, D., Qin, G., Pan, J.: The human resource architecture model: a twenty-year review and future research directions. Int. J. Hum. Resour. Manag. 1–38 (2020). https://doi.org/10.1080/09585192.2020.1787486
14. Marôco, J.: Análise Estatística com o SPSS Statistics, 8th edn. ReportNumber (2021)
15. Rebelo, G., Almeida, A., Pedra, J.: Telework and work intensity: insights from an exploratory study in Portugal during the COVID-19 pandemic. Adm. Sci. **14**, 14 (2024). https://doi.org/10.3390/admsci14010014

16. Santos: Cálculo Amostral em Ciências Sociais. Prática Clínica (2017). https://praticaclinica.com.br/anexos/ccolaborativa-calculo-amostral/ccolaborativa-calculo-amostral.php
17. Tavares, F., Santos, E., Diogo, A., Ratten, V.: Teleworking in Portuguese communities during the COVID-19 pandemic. J. Enterp. Communities People Places Glob. Econ. **15**(3), 334–349 (2021). https://doi.org/10.1108/JEC-06-2020-0113
18. Van Looy, A.: How the COVID-19 pandemic can stimulate more radical business process improvements: using the metaphor of a tree. Knowl. Process Manag. **28**(2), 107–116 (2021). https://doi.org/10.1002/kpm.1659
19. Zamanov, S.: Team management. J. Manag. Sci. **10**(2), 11–14 (2020). https://doi.org/10.26524/jms.2020.2.3