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# Building telework capability in the new business era for SMEs, using spherical fuzzy AHP methodology for prioritizing the actions

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## Abstract

Working types are one of the main issues affected by the turbulences in today's business life and should be handled carefully. Telework is developing in the shadow of information and communication technologies and has become a necessary capability for companies to adapt to today's business conditions. This study determined the importance of the factors in the telework structure with the analytic hierarchy process method. This multi-criteria decision-making method uses fuzzy numbers, which is rare in the telework literature. The results of this study in the context of SMEs show that the factors related to the work attributes significantly impact the telework capability structure. Adoption of telework by senior management as a business strategy is the factor with the highest impact, with some factors related to the culture being other factors with high impact. The fact that technological infrastructure factors did not show the expected effect was a surprising result.

**Keywords** Telework, Flexible work, Business strategy, AHP, Spherical fuzzy

## Introduction

There has been a severe increase in environmental disasters, crises, and epidemics worldwide in recent years. One of the adverse effects of these situations, which increase in number and expand their sphere of influence, is that they cause business interruptions. The most recent example of this is the COVID-19 pandemic declared in 2020. The pandemic has caused severe chaos in many countries, causing a complete cessation of activities in many business sectors. In such cases, companies have turned to flexible work arrangements in which the place and time of work are diversified to maintain their existence and ensure business continuity [57]. Flexible work arrangements give companies flexibility regarding the time and place of work. In this way, in all kinds of adverse

situations, the work can be done anywhere or at any hour, depending on the conditions. This flexibility promises to contribute to business continuity.

Flexible work arrangements have a long history in business life and have various types in practice. These types include flexible shift work, flexible schedules, compressed work weeks, job sharing, work sharing, and telework [10]. Each of these types offers a variety of temporal and spatial flexibility. The COVID-19 pandemic and the lockdowns caused flexible working types in which flexible time and space applications are combined. Work carried out remotely through information communication technologies has become popular as management practices in this period. Telework, a flexible work arrangements application type in which these qualities can be combined, has come to the forefront compared to other application types [8].

Telework came to the fore as an effective tool for ensuring business continuity, especially during the COVID-19 pandemic. Planning telework models is recommended by the International Labor Organization (ILO) as a

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powerful tool for SMEs in its guide to pandemic preparedness and business continuity in 2009 [31]. According to World Bank data, SMEs account for approximately 90% of businesses and over 50% of employment worldwide [65]. In case of any business interruption, SMEs caused weaken the country's economy. In addition, SMEs can easily be vulnerable to external shocks, crises, and uncertainties due to defects such as lack of funds, weak ability to withstand market risks, and relatively backward technical equipment [1, 69]. In the 2020 ILO report, it has been revealed that the group of companies that are most negatively affected by the COVID-19 pandemic in the business world is SMEs, and it is recommended that states take measures to help SMEs to adapt to the new economic order after COVID-19 [33]. In the sectoral context, the service sector is under pressure to include telework in business processes due to factors such as the uninterrupted provision of services obligation and the changes in customer expectations, as well as its advantage in teleworking and its propensity to handle things through digital technologies.

Despite the waning impact of the pandemic, telework remains an essential practice in today's business world. Telework, the most prominent type among flexible working arrangements [8], increases company resilience and business continuity [20, 46]. According to a study on this subject, the types of telework companies adopt, include in their business processes, and implement regularly provide high resilience [67]. In addition, in the literature, telework offers an increase in corporate performance [4], is the best solution for companies in times of shock and crisis [25, 28], allows communication with customers in times of crisis [47], a business strategy that contributes to resilience [60] and helps to provide economic resilience [6].

In addition, Pandya et al., in their projections for the next ten years in 2022, have depicted a new business world where 40% more of the current business will be driven by automation, artificial intelligence, and virtual reality [53]. The authors point to acquiring new capabilities as the key to success in this new business world. In this new world of work, it can be predicted that classical work applications will be replaced by flexible applications such as telework. In this direction, the implementation of telework and its integration into business processes represent a dynamic capability for companies.

According to the dynamic capabilities theory, dynamic capabilities are "the firm's ability to integrate, build and reconfigure internal and external competences to address rapidly changing environments" [61]. Companies should be able to work remotely as a solid argument to ensure business continuity in all adverse conditions. The literature on telework contains the results that telework is

affected by some internal and external factors in parallel with the dynamic capabilities theory. Stoian et al. [60] proposed a "telework systematic model" which includes internal and external factors affecting telework by considering telework's inputs, outputs, results, and effects. Gohoungodji et al. [26] revealed the trend change in the literature over the years with the systematic and critical review research on telework and categorized the factors affecting telework into five groups based on the literature. Yorulmaz [66], on the other hand, revealed the structure of telework as a talent consisting of three dimensions and ten sub-dimensions, including internal and external factors, from the company's perspective.

Although the studies in the literature on telework reveal the structure of telework as a capability, which consists of and is affected by some internal and external factors, the importance degree of these factors continues to exist as a subject open to discovery. Gohoungodji et al. [26] pointed out the gap in this area by emphasizing the need for future quantitative studies to confirm the effects of factors affecting telework on telework, which they revealed as a result of their research. As one of the originalities of our study, it is aimed to contribute to this gap in the literature. In our study, the importance degree of the factors in the telework structure revealed by Yorulmaz [66] will be determined using the AHP method, which can measure various factors of a complex decision-making process hierarchically and facilitates combining them into a whole [54]. As a result of the study, which focused on SMEs operating in the service sector, it is also aimed to support companies in terms of which factors should be given priority and weight in having the telework capability, which has become almost a necessity for SMEs to ensure business continuity.

This study consists of 6 parts. The next part is the literature summary, part 3 is the methodology, part 4 is the application and results, part 5 is the discussion, and the last part is the conclusions. In the second part of the study, information about the concept of telework and its sub-fractions will be given. In addition, literature studies on this subject will be summarized. The third part will give information about AHP and spherical fuzzy numbers to be used in the study. In the fourth part of the study, the results of the analysis made in the application will be shared. In the last section, the results will be discussed with the literature.

This study presents several novel contributions. Firstly, an original set of criteria has been developed through a comprehensive review of the literature and a qualitative study. This set includes both main and sub-criteria that are relevant to the determination of a telework strategy. The second original contribution of this study is its methodology. Multi-criteria decision-making methods

that incorporate the concept of teleworking are relatively uncommon in the literature. Moreover, the utilization of fuzzy numbers is another original aspect of this study. Fuzzy numbers offer an advantageous approach to analyzing decision problems under uncertainty. These original contributions significantly enhance the value of this study. Creating a new set of criteria and applying a unique multi-criteria decision-making methodology offers valuable insights for practitioners and academics alike. Additionally, the use of fuzzy numbers demonstrates the study's ability to address real-world problems that are inherently uncertain.

## Telework

Telework is using information and communication technologies outside the workplace [15]. Telework can be implemented by integrating technology into work and using it as a tool. One pillar of telework is digitalization, which means converting analog information to digital information using tools such as web-based applications that facilitate remote access and collaboration, cloud computing, and work calendar applications [34]. Another pillar is digital transformation, which means the use of new digital technologies (embedded systems, data analytics, social media, mobile applications, artificial intelligence, etc.) for business development (creating new business models, customer experience, etc.) form [18].

Official labor market data show that telework is a growing trend in business, increasing since the 2000s [16]. Today, due to the development of information and communication technologies, telework is expected to increase its presence in the business world, while the COVID-19 pandemic has accelerated this process, even carried it even further, and made telework a necessity [8]. Each company implements telework in various ways that will suit itself and its business model. A wide range of application types is encountered, from working entirely from home to working remotely in exceptional cases [67].

Telework is incomplete when considered only in the technology, digitalization, and digital transformation triangle. Apart from technology and machines, it contains the human factor as a part of work, and in connection with this, it also has soft elements. In addition, studies have shown that the suitability of the work to be carried out with telework is one factor that affects the implementation of telework [12, 27]. Gohoungodji et al. [26] the factors affecting telework in the study include; media richness, experience, communication, work-family facilitation, supervisor support, top management support, and trust. Yorulmaz [66], as a result of his research, revealed the structure of teleworking as a capability consisting of technological infrastructure, culture, and work attributes dimensions. According to

the research results, the critical telework factors are hardware and software depend on technological infrastructure; working order, adoption, trust, and habits, depending on culture; efficiency perception, implementation history, job suitability, and business strategy, depending on work attributes.

## Telework critical factors

### Technological infrastructure

Technological infrastructure components are considered critical factors in telework applications. Technological infrastructure is vital in providing work organization in telework applications regarding employees' access to data and synchronized communication. Telework applications are realized thanks to the support of technology and the existence of technological infrastructure [26]. Software and hardware components come to the fore in the technological infrastructure required in telework applications. These components include the software suitable for the nature and requirements of the job that will allow remote working and the physical hardware that will enable remote working by using this software [66].

The technological infrastructure that allows remote working includes elements such as fifth-generation mobile network technology, implementation of cyber security measures, interoperability, and integrated systems [50]. To implement telework, tools such as computers, tablets, and phones represent hardware elements [32]. At the same time, tools such as planning software and project management software [60], web-based applications, and cloud computing [34] are also software elements. The effects of technological elements on telework applications are also emphasized in various research. Turkeş et al. [63], while stressing the importance of information security management and digitalization in telework, according to Iwaniuk et al. [35], deficiencies in digitalizing jobs using technological elements constitute one of the biggest obstacles to telework implementation.

The fact that the technological infrastructure is accessible in the company's context is critical. Although companies strengthen their technological infrastructure, they may experience weakness in telework applications due to the deficiencies in technical and technological infrastructure providers and the stakeholders they contact in the business environment. In the studies on this subject, it has been concluded that the lack of technical and digital infrastructure in companies operating in developed countries is relatively more in the background than the others [51]. In addition, according to another result achieved, the unsuitability of the internet infrastructure in low-income countries negatively affects telework [23].

## Culture

Creating a culture appropriate for the companies to have telework capability is seen as a critical factor. In the culture structure proper to telework, the company management and telework should be adopted by employees [9]. To ensure that, companies should determine humane policies that convince employees of issues open to abuse, such as the overemployment of employees [26]. The working order should be well described to shape the culture, a soft element of telework. The top management should clearly define the working order in a way that is understandable and applicable to employees [66].

Classical working habits of employees may be an obstacle in creating a suitable cultural structure for telework. Companies should make efforts to change these habits through telework. The research results conducted on this subject show that young employees who have previously experienced telework or live in the age of information and communication have been quickly adapting to telework and that elderly employees have difficulty adapting due to habits [3].

Another part of the cultural structure suitable for teleworking is building trust. Research on this subject reveals the necessity of managers' trust in employees within the cultural structure [22, 48]. Although specific controls can be made with technological means to prevent the employee from shirking from work, it is possible that these can be manipulated with the help of technology [66]. At this point, trust comes to the fore as a critical element for the continuity of telework. This trust can be demonstrated by managers supporting employees [5, 64], and establishing such a culture will help remove barriers to telework [19].

Most research considers culture as a critical factor for telework. Criscuolo et al. [7] and Ollo-Lopez et al. [50], the results obtained in their studies support this. Some studies on this subject emphasize the advantage of small firms in creating culture. Small firms have advantages in performance management, collaborative working environment, and designing the work by teleworking due to their tiny structure [60]. In addition, Hofstede's studies on social culture [29, 30] show that companies in cultures with high individualism value trust their employees more. This indicates that these companies have an advantage in creating a culture of trust suitable for telework.

## Work attributes

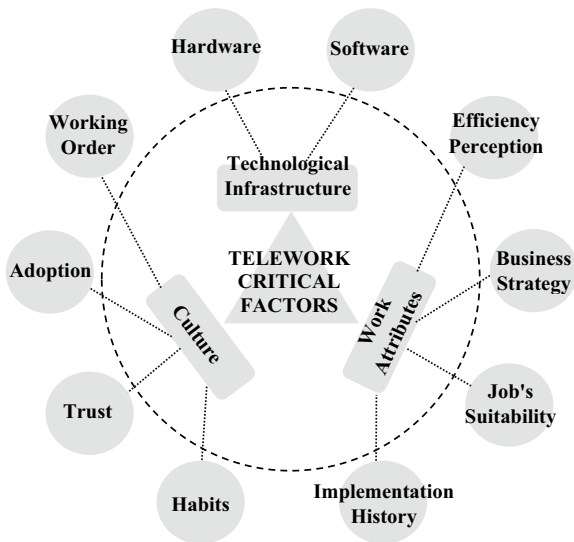
In telework applications, soft elements related to human and technological infrastructure and some features related to business and company are critical factors. The suitability of the work to be done with telework and the fact that telework was applied in the company before can

be counted among these features. In addition, the fact that telework is seen as a business strategy by the senior management and the efficiency in the execution of the work with telework can be counted among the factors affecting the telework application.

Only some professions are suitable to be carried out by telework. Sectors suitable for telework are mostly technological companies, banking services, and insurance companies, especially those operating in the service sector and where "white-collar" workers are concentrated [2]. Research on this subject shows that some professions and jobs are suitable to be carried out entirely by telework, and this compliance rate increases as the developed levels of countries increase [12, 52]. The predominance of the service sector in developed countries and the fact that occupations mainly based on communication and information at the desk are effective on these rates.

Studies have yielded results supporting efficiency to be a critical factor in the implementation of telework [45]. Measuring the efficiency of the work done or the perceived efficiency factor is decisive for the company to continue the telework application [66]. Some research conducted before the COVID-19 pandemic reveals that companies see telework as a loss of productivity. Managers see telework only as a provisional application to ensure business continuity in times of crisis and think that it causes inefficiency due to loss of connection, cooperation, and face-to-face communication in regular times [28]. It has also emerged that managers are concerned about monitoring the performance of employees when telework is applied [56]. Research after the COVID-19 pandemic shows that these views have changed. As a result of a large-scale survey covering 25 countries, managers have a positive evaluation of telework for company performance and want to significantly increase the rate of regular telework implementation and integration into business processes compared to pre-pandemic [7].

Implementing telework is also related to seeing the application as a business strategy to ensure business continuity and stay caught up in the competition. Research results reveal that telework applications emerged as a business strategy to ensure business continuity [13, 44] and to develop [26], especially during the COVID-19 pandemic. Yorulmaz et al. [67] and Stoian et al. [60] suggest that telework should be developed as a business strategy to ensure resilience and business continuity. Implementing telework as a business strategy in the company will facilitate adapting the whole system to telework and ensure business continuity during adverse events such as crises and disasters. Research on this subject shows that the previous telework applications provide an advantage in rapid transition and adaptation to telework in times of crisis [28].



**Fig. 1** Telework critical factors. *Source:* This illustration was created based on the study of Yorulmaz [66]

The applications of telework as a capability for companies and the critical telework factors that form the basis of this research are presented in Fig. 1 based on the work of Yorulmaz [66].

**Methodology**

**Spherical fuzzy sets (SF sets)**

The numbers in the spherical fuzzy set consist of 3 components. They are membership value, non-membership, and hesitancy values, respectively. A spherical fuzzy set is defined as follows [37].

$$SF = \{(\mu, \nu, p) \mid 0 \leq \mu^2 + \nu^2 + p^2 \leq 1\}$$

here  $\mu$ ,  $\nu$ , and  $p$  are the membership, non-membership, and hesitancy degrees of the spherical fuzzy number, respectively.

**Analytic hierarchy process (AHP)**

The analytic hierarchy process (AHP) is a mathematical method in decision-making analysis. It is a frequently used method for dealing with complex decision-making issues involving several criteria [59]. This structure expresses the relationships between sub-factors under each level with the factors above it. The decision-maker is in charge of defining the level of importance of each criterion or goal and then evaluating each alternative's suitability for each criterion [55].

AHP generates a preference rating and chooses the best option based on these evaluations. In various fields, such as business, engineering, health, and environmental management. AHP is widely employed [21, 24]. AHP's methodical and impartial approach can also aid in minimizing uncertainty and bias during the decision-making process [24].

The algorithmic steps of the AHP method are as follows [14, 24, 62]:

- *Step 1* Factor and sub-factor are created for the goal.
- *Step 2* Each related factor is compared pairwise. Saaty's 1–9 comparison scale [55] is used. A decision matrix ( $D$ ) is created from the responses.

$$D = \begin{bmatrix} 1 & \dots & d_{1n} \\ \vdots & \ddots & \vdots \\ 1/d_{1n} & \dots & 1 \end{bmatrix} \tag{1}$$

- *Step 3* The decision matrix is translated into fuzzy linguistic expressions. Linguistic variables are given in Table 7.
- *Step 4* The average of the experts is taken by Eq. (2).

$$SFWGM_W(\tilde{D}_1, \tilde{D}_2, \dots, \tilde{D}_n) = \left\{ \begin{array}{l} \prod_{i=1}^n \mu_{D_i}^{\frac{1}{n}}, \\ \left[ 1 - \prod_{i=1}^n (1 - \nu_{D_i}^2)^{\frac{1}{n}} \right]^{\frac{1}{2}}, \\ \left[ \prod_{i=1}^n (1 - \nu_{D_i}^2)^{\frac{1}{n}} - \prod_{i=1}^n (1 - \nu_{D_i}^2 - p_{D_i}^2)^{\frac{1}{n}} \right]^{\frac{1}{2}} \end{array} \right\} \tag{2}$$

**Table 1** Decision matrix for main factors

	Culture			Technological infrastructure			Work attributes		
	m	v	p	m	v	p	m	v	p
Culture	.50	.50	.50	.61	.36	.31	.38	.61	.28
Technological infrastructure	.37	.61	.28	.50	.50	.50	.31	.69	.22
Work attributes	.61	.37	.29	.68	.32	.22	.50	.50	.50

**Table 2** Weights and consistency analysis results for main criteria

Criteria	Weights
Culture	.316
Technological infrastructure	.265
Work attributes	.418
CI = .025 RI = .58 CR = .04	

**Table 3** Weights and consistency analysis results for culture criteria's sub-criteria

Criteria	Weights
Habits	.18
Working order	.30
Trust	.20
Adoption	.31
CI = .021 RI = .9 CR = .023	

- *Step 5* The matrix obtained by the mean is taken into account. With Eq. (3), this matrix is averaged on a row basis.

$$SFAM_W(\tilde{D}_1, \tilde{D}_2, \dots, \tilde{D}_k) = \left\{ \begin{array}{l} \left[ 1 - \prod_{i=1}^k (1 - \mu_{D_i}^2)^{\frac{1}{k}} \right]^{\frac{1}{2}}, \\ \prod_{i=1}^k v_{D_i}^{\frac{1}{k}}, \\ \left[ \prod_{i=1}^k (1 - \mu_{D_i}^2)^{\frac{1}{k}} - \prod_{i=1}^k (1 - \mu_{D_i}^2 - p_{D_i}^2)^{\frac{1}{k}} \right]^{\frac{1}{2}} \end{array} \right\} \quad (3)$$

spherical fuzzy numbers are used. It is emphasized that these numbers analyze uncertainty better with the com-

- *Step 6* The mean rows obtained are the weights of the criteria. These weights are clarified with the help of Eqs. (4–5).

$$S(\tilde{w}_j^s) = \sqrt{\left| 100 * \left[ \left( 3\mu_{\bar{A}_s} - \frac{p_{\bar{A}_s}}{2} \right)^2 - \left( \frac{v_{\bar{A}_s}}{2} - p_{\bar{A}_s} \right)^2 \right] \right|} \quad (4)$$

$$S(\tilde{w}_j^s) = \sqrt{\left| 100 * \left[ \left( 3\mu_{\bar{A}_s} - \frac{v_{\bar{A}_s}}{2} \right)^2 - \left( \frac{\eta_{\bar{A}_s}}{2} - v_{\bar{A}_s} \right)^2 \right] \right|} \quad (5)$$

- *Step 7* As in the classical AHP, the consistency ratio is checked. The value must be less than 0.1.

Using the AHP method with other fuzzy number sets is preferred [11, 58, 65]. The most important advantage of this is that fuzzy numbers can better represent uncertainty in linguistic variables [39, 43, 68]. In this study,

ponents of membership (m), non-membership (v), and hesitancy (p) [40].

**Application and results**

The objective of this investigation is to identify the primary and subordinate factors that exert the greatest influence on the telework strategy. To achieve this, the hierarchical arrangement depicted in Fig. 1 was assessed utilizing the spherical fuzzy AHP (SF-AHP) methodology. The decision matrix for main factors derived from

**Table 4** Weights and consistency analysis results for technological infrastructure criteria's sub-criteria

Criteria	Weights
Hardware	.44
Software	.56
CI = .0 RI = .0 CR = .0	

the evaluations of domain experts, based on a nine-point scale, is presented in Table 1.

Table 1 presents the average values of the global fuzzy numbers of three experts' evaluations. The AHP procedure was performed on the decision matrix, and the corresponding weights were computed. Additionally, Table 2 provides a summary of the relevant consistency ratio values.

As the CR value obtained is less than 0.1, it can be inferred that the decision matrix is consistent. Accordingly, it has been observed that the work attributes criterion holds the highest importance weight of 0.418 and, therefore, can be considered the most influential criterion in the telework strategy. Conversely, the technological infrastructure criterion has the lowest significance weight of 0.265 among the other criteria.

Similarly, the most important criteria were tried to be determined among the sub-criteria. To achieve this aim, the sub-criteria falling under the culture criterion and others were examined utilizing the SF-AHP method based on expert judgments. The resulting importance weights and consistency analyses were computed and presented in Table 3.

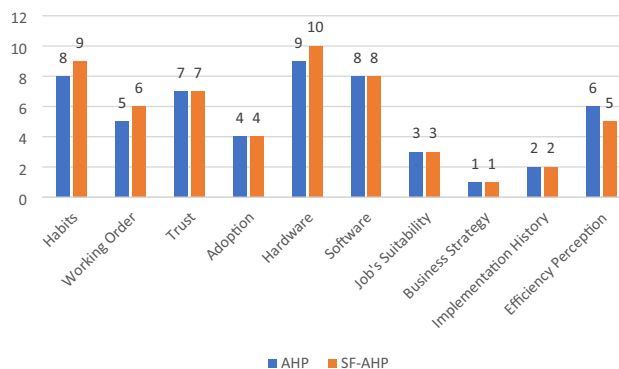
As the CR value obtained is less than 0.1, it can be inferred that the decision matrix is consistent.

**Table 5** Weights and consistency analysis results for work attributes criteria's sub-criteria

Criteria	Weights
Job's suitability	.244
Business strategy	.258
Implementation history	.252
Efficiency perception	.246
CI = .089 RI = .9 CR = .099	

**Table 6** Global weights for all criteria

Main criteria	SF Weights			Sub criteria	SF local weights			SF global weights			Weights
	m	v	p		m	v	p	m	v	p	
Culture	.51	.50	.50	Habits	.42	.59	.50	.22	.67	.46	.07
				Working order	.58	.43	.22	.30	.57	.41	.12
				Trust	.41	.60	.30	.21	.67	.40	.07
Technological infrastructure	.41	.60	.32	Adoption	.60	.41	.23	.31	.56	.41	.12
				Hardware	.44	.58	.50	.18	.70	.40	.06
Work attributes	.61	.40	.32	Software	.45	.58	.08	.18	.70	.25	.07
				Job's suitability	.52	.50	.50	.31	.57	.44	.12
				Business strategy	.49	.52	.22	.30	.58	.32	.13
				Implementation History	.47	.54	.20	.29	.60	.31	.12
				Efficiency Perception	.47	.55	.22	.28	.60	.32	.12



**Fig. 2** Comparative analysis results

Accordingly, it has been observed that the adoption criterion holds the highest importance weight of 0.31 and, therefore, can be considered the most influential criterion in the habits. Conversely, the habits criterion has the lowest significance weight of 0.18 among the other criteria.

Upon examination of Table 4, it can be observed that there are two sub-criteria under the technological infrastructure criterion. According to expert opinions, the software has been identified as the most significant technological criterion, while the hardware criterion is perceived as less critical, with a weight of 0.44 (Table 5).

Finally, the sub-dimensions of the work attributes criterion were analyzed. The consistency ratio of the analysis obtained was calculated as less than 0.1. According to the analysis results, the business strategy criterion has the highest importance weight of 0.258, while the criterion with the lowest importance weight is the efficiency perception criterion.

Table 6 presents the fuzzy local weights of the main and sub-criteria. The global weights were then calculated by multiplying the weight of the main criterion

with the local weight of each sub-criterion. These weights were subsequently converted to normal weights using the defuzzification process. Based on these normal weights, the business strategy criterion was identified as the most significant sub-criterion.

In addition, the results were compared with the results of the traditional AHP method. The results are given in Fig. 2.

According to Fig. 2, it can be seen that the results are similar for both methods.

## Discussion

Our research findings revealed that the most critical factors affecting the telework application are the factors related to the work attributes. While seeing telework as a business strategy stands out among these factors, efficiency perception, job's suitability, and implementation history factors have a similar and balanced weight to the business strategy factor. In the culture dimension, working order and adoption factors differ significantly from other factors in the same dimension. In addition, one of the research's surprising findings is that the technological infrastructure has the lowest importance at both the dimension and the sub-dimension level.

Some studies in the literature on telework differ from our findings on technological infrastructure in terms of their results. In these studies, results were obtained on the importance of technology access and technological skills for telework [38], as well as the requirements and importance of providing technologies and tech support and hardware, and teleworkers access to the information they need and software [42]. The reason for the divergence in the findings can be shown as the developments in both software and hardware aspects of the technological infrastructure related to telework, especially since telework is one of the most important alternatives to ensure business continuity during the COVID-19 period and is sometimes required by governments. Thanks to these developments, companies can access technological infrastructure factors more easily, and this issue is far from being the main agenda for telework. Gohoungodji et al. [26] supported these results in a large-scale systematic and critical review study on telework and showed that although technological and digital tools are essential for successful telework applications, they lost their priority and popularity over time and left their place to new factors in post-2010 studies.

Gohoungodji et al. [26] listed some of these factors that significantly impact telework, such as trust, task planning, and top management support. These factors correspond to the culture dimension in our study. The necessity of establishing a suitable cultural structure for the success and continuation of telework applications

Franken et al. [19] is also supported by the research results. As a result of our analysis, the sub-dimensions of working order and adoption regarding the culture dimension come to the fore. Our findings reveal the importance of preferences and willingness to sustain telework in their research emphasizing adoption by Cortes-Perez et al. [9]. Also, Okubo et al. [49] result that the working order and the clearly defined tasks obtained in the research positively affect telework efficiency and are in line with our research results. The trust sub-dimension depending on the culture dimension is an important component in the study of telework literature [17, 36]. Today, thanks to the advanced software developed in accordance with telework, it is relatively easy for managers to follow-up with employees. These developments may explain the divergence of the trust factor from the literature findings by not being in the top ranks in terms of the importance of the trust factor in our research findings.

The strongest support for the work attributes dimension and the business strategy sub-dimension, which stand out as the factors with the highest impact on telework in our findings, was given by research results of Yorulmaz et al. [67]. In the research they conducted in the service sector, the effects of telework types on resilience were investigated, and based on the results of the research; it was suggested that the company adopt regular telework models as a business strategy. The suitability of work for remote work is another finding with high weight in our research. It is also emphasized by previous literature that not every profession is suitable for teleworking [27, 41]. In addition, previous studies have obtained results in parallel with our findings that companies with a history of telework implementation both provide the advantage of rapid transition and adaptation to telework in unexpected adverse situations [28] and increase telework efficiency [49]. According to Mihalca et al. [45], the prominent productivity perception and job performance results regarding telework support our research.

## Conclusions

The primary purposes of this study are to measure the importance of the factors affecting telework, which is considered a capability for companies, and to provide directions based on empirical evidence to companies on the way to having this capability. In the theoretical sense, the study is to contribute to the gap in the literature regarding the importance of the factors in the telework structure and indirectly to the dynamic capabilities theory. With this study, the telework structure as a capability is analyzed based on dimensions and sub-dimensions, and valuable insights are provided on the importance of the criteria in having telework capability from the perspective of top management. These insights will help



companies turn to the right factors on the way to teleworking capability.

Our research analysis, which reached its goals, proved that the most critical factor influential in owning telework, considered a capability, in today's conditions, is that telework is seen as a business strategy by companies. This result, which draws attention as a result of changing trends due to the developments in the business world and working styles, especially in the post-COVID-19 period, offers companies to stay caught up in competition, competitive advantage or durability, and business continuity.

The results show that other components are categorized within the dimension of work attributes, that the work done is suitable for telework, that the application has been carried out in the past, and the perception of efficiency has a high degree of importance in having this ability. While these results indicate that companies should attach significance to adaptations for business conduct with digital tools, it can be said that both perceived efficiency and productivity can be achieved thanks to these adaptations. Thanks to integrating telework applications into the company as a business strategy, the application history feature will be gained by default, and the entire business design will be adapted to telework in case of any negativity.

Evidence of the research for creating the right culture for telework capability points to the importance of working order and adoption. Correctly digitizing jobs will serve to ensure good working order. Top management's attitude toward telework and employee support can also help drive adoption. Although the findings do not highlight, efforts to establish trust and change regular working habits as components of culture should not be neglected for teleworking ability. In addition, it should not be forgotten that the technological infrastructure factors, which have been proved by this research that they do not have their former importance in the telework structure, have a feature that does not appear in the present but makes the telework capability meaningless in the absence of it.

Finally, this study has some limitations. Considering the ten factors that affect telework is one of these limitations. In future studies, these criteria can be reanalyzed by increasing the number of criteria. Another limitation of the study was SMEs in the service sector. Analysis can be made on other business types with the same criteria. In addition, it is recommended to carry out more detailed studies based on the sector. SF-AHP method was used in the method of the study. Results can be compared by using different methods such as DEMATEL and ANP.

## Appendix

See Table 7.

**Table 7** Linguistic variables

Scale	m	v	p
9	0.9	0.1	0
8	0.85	0.15	0.05
7	0.8	0.2	0.1
6	0.75	0.25	0.15
5	0.7	0.3	0.2
4	0.65	0.35	0.25
3	0.6	0.4	0.3
2	0.55	0.45	0.4
1	0.5	0.5	0.5
0.5	0.45	0.55	0.4
0.333333	0.4	0.6	0.3
0.25	0.35	0.65	0.25
0.2	0.3	0.7	0.2
0.166667	0.25	0.75	0.15
0.142857	0.2	0.8	0.1
0.125	0.15	0.85	0.05
0.111111	0.1	0.9	0

### Abbreviations

AHP	Analytic hierarchy process
ILO	International Labor Organization
SF-AHP	Spherical fuzzy AHP

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### Author contributions

SE made the methodology and analysis part, while HY compiled introduction, literature review, discussion, conclusion, and the overall formatting of the paper.

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