

Empirical Research Paper

Do the Project Manager's soft skills foster knowledge sharing? [☆]Inês Avença ^a, Luísa Domingues ^{a,*}, Helena Carvalho ^b^a Instituto Universitário de Lisboa (ISCTE-IUL), ISTAR, Lisboa, Portugal^b Instituto Universitário de Lisboa (ISCTE-IUL), CIES-IUL, Lisboa, Portugal

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ABSTRACT

In the realm of project management, the significance of soft skills, including communication, leadership, and problem-solving, has been acknowledged as pivotal to project success. Furthermore, the role of knowledge management within projects has emerged as another critical determinant of performance enhancement. This entails disseminating best practices, lessons learned, and insights garnered throughout the project lifecycle. Thus, the Project Manager's role acts as a catalyst, cultivating an environment that promotes effective knowledge sharing.

The primary objective of this study is to explore the relationship between project manager soft skills and knowledge sharing within project environments. Additionally, considering the acknowledged impact of organizational culture and environment on knowledge sharing practices, this research aims to examine the moderating effect of organizational culture in shaping the relationship between soft skills and knowledge sharing effectiveness within project contexts. A questionnaire involving project team members was conducted to find answers to these questions.

Findings reveal the project manager leadership was positively associated with knowledge sharing among project management team members. This conclusion innovatively connects the importance of soft skills in fostering knowledge sharing within project teams. It places a significant emphasis on the project manager's leadership skills assigning them a key responsibility. Additionally, moderation analysis showed that knowledge creation and knowledge capture strengthened the relationship between project manager's problem-solving skills and knowledge management environment. This underscores the role of a robust organisational culture in supporting knowledge sharing, thereby enhancing the connection between problem-solving abilities and explicit knowledge sharing.

1. Introduction

Recent economic and social changes have pushed organizations to reorganise themselves to be more competitive, flexible, and time-to-market effective. Thus, project development has proliferated in organizations as projects' economic and strategic value has been realised. Despite the benefits, the high failure rates of projects show that adapting to this fast-changing environment has not been easy (Hassani & Bouzekri El Idrissi, 2020; De Sousa et al., 2018; Papke-Shields et al., 2010; Ika, 2009). This concern has prompted research into the key factors that influence project success (Ayat et al., 2021; Fareed et al., 2021; Pacagnella, 2019; Joslin and Muller, 2015). Several studies concluded that project manager experience, involvement, and skills are critical success factors for project success (Irfan et al., 2021; Ghani et al., 2017; Adzmi

and Hassan, 2018; Dai and Wells, 2004; Munns and Bjeirmi, 1996). Although for many years, the emphasis has been on managers' technical skills (hard skills) (Awan et al., 2015; Maqbool et al., 2017), several studies have found a relevant relationship between soft skills and project success, such as communication, leadership, and problem-solving skills (Fareed et al., 2021; Alvarenga et al., 2020; Maqbool et al., 2017; Awan et al., 2015; Muller and Turner, 2010). Therefore, research has progressively emerged claiming the primacy of soft skills over hard skills (Marnewick and Marnewick, 2021; Araújo and Pedron, 2015; Stevenson and Starkweather, 2010; Creasy and Anantatmula, 2008; Skulmoski and Hartman, 2008). However, there remains a shortage of literature on soft skills and how project managers perceive them (Millhollan et al., 2016).) A further critical factor for project success is the management and sharing of knowledge within the project. The documentation of good

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practices, lessons learned, and knowledge acquired during the project lifecycle becomes increasingly critical, as these assets can be leveraged throughout the organisation in the future. As the literature indicates, reusing previously acquired knowledge results in more efficient and effective project outcomes (Alves and Carvalho, 2023; Hanisch et al., 2009). Consequently, knowledge transfer and sharing have become key processes to improve project development, allowing organizations to benefit from its positive outcomes (Mahura and Birollo, 2021; Liebowitz and Megbolugbe, 2003).

Although the growing number of projects in organizations, combined with the use of technology in project management, has increased the available information on projects, effective knowledge management within projects remains lacking. Hence, both organizations and managers are beginning to recognize the importance of not only managing existing knowledge, but also optimizing it through knowledge sharing (Dinh et al., 2016; Hanisch et al., 2009). Research into the factors that positively influence knowledge sharing in the context of the project has therefore proved to be important (Dinh et al., 2016; Reich et al., 2012; Liebowitz and Megbolugbe, 2003). In pursuit of this objective, Badewi's (2016) research identified project management as a vital catalyst to promote knowledge sharing, which underscored the pivotal role and capabilities of project managers. A study conducted by Mueller (2012) concluded that the knowledge-sharing environment encouraged by project managers could create processes that strengthen trust and improve the adherence of project team members to a joint commitment to the project and organisational success. Reich et al. (2012) corroborate the idea that the role of the project manager, in fostering an environment of knowledge exchange and overseeing knowledge methodologies, has an important impact on the project team's ability to produce high-quality knowledge artifacts and ensure their coherence.

Furthermore, the connection between organizational culture and knowledge-sharing practices within project settings found a notable correlation in such environments (Reich et al., 2012; Ajmal et al., 2009). In that context, these studies emphasize the vital role of project managers in this correlation, highlighting their responsibility to align knowledge-sharing practices with the prevailing organizational culture.

In light of these considerations, this research endeavours to respond to two propositions: (P1) the key importance of project managers' soft skills in project success; and (P2) the decisive role of the organizational context in promoting a culture of knowledge sharing. These propositions served as foundational concepts upon which hypotheses were formulated. We aimed not only to assess the relationship between project manager's soft skills and knowledge sharing but also to analyse the potential moderating role of organizational culture in this relationship. This study contributes to a deeper understanding of the factors associated with project success and knowledge management in the contemporary organizational landscape.

2. Literature review

Project Manager Soft Skills.

Projects are playing an increasingly important role in organizations, contributing to ensure flexibility and competitive advantage. However, the development of projects within organizations has been a major concern and source of controversy, as their low success rates indicate that adapting to a fast-changing environment is not an easy task (Hasani & el Bouzekri El Idrissi, 2020).

To reduce the low success rate of projects, numerous studies have been conducted to identify the most crucial factors for project success. The investigations conclusions allowed the scientific community and organizations to find determining factors for the project's success, enabling investment in it. When a positive association between the project manager's skills and abilities and project success began to be found in different studies, the role of the project manager was again reviewed and analysed. Research conducted to identify the critical factors for project success highlights project management as a crucial

enabler (Badewi, 2016). Having project management under scrutiny, the focus has fallen on the project manager who has become elevated to a role of great importance within the organisation. According to PMI, project manager responsibilities, together with the team, customers, sponsors, are related to setting objectives and using their capabilities to ensure the project is delivered within stipulated requirements (PMI, 2021).

Authors initially developed research to study the role and competencies of project manager, primarily focusing on technical skills and how they affect the business and project context. However, subjects such as leadership, motivation, culture, and communication emerged (Awan et al., 2015; Maqbool et al., 2017; Adzmi and Hassan, 2018), bringing more awareness to soft skills. A study assessing the impact of project manager skills on project success concluded that to enhance the likelihood of project success in the public sector, investments should target improvements in project managers' interpersonal skills, along with their awareness of project management (Irfan et al., 2021). Moura et al. (2021) contributed to the ongoing discourse on the factors that influence the high performance of information systems project teams, concluding that the human-centered dimensions outweigh technical aspects in importance. They also emphasized that soft factors, akin to soft skills such as communication, conflict management, and trust, play a significant role in influencing the performance of team members.

Table 1 summarises the contributions from the literature identifying the soft skills of project managers that affect project success.

The importance of communication as the most frequently mentioned characteristic among the studies carried out can be seen by analysing the table. It can also be observed that several soft skills, such as communication, conflict management, leadership, team building, people skills, and problem-solving, are usually analysed together. The project manager's vital role in project success and the necessity to enhance inter-project knowledge sharing were highlighted. Consequently, we hypothesized how each soft skill might influence explicit and tacit knowledge sharing, as depicted in Fig. 1.

H1. Project manager soft skills are associated with explicit and tacit knowledge sharing.

2.1. Knowledge sharing in the project environment

Knowledge management (KM) involves effectively and systematically selecting, storing, and sharing knowledge within organizations. In project environments, KM influence has been growing, due to the complexity of projects being a relevant risk factor for success. To mitigate this risk, organizations have recognized the need for efficient knowledge transfer, placing greater leading to a greater emphasis on a proper KM in project environments. Effectively managing and transferring knowledge allows organizations to achieve better project outcomes and gain a strategic advantage.

Knowledge management processes encompass several key stages critical for effective knowledge utilization within organizations. Based on the models created over the years, several authors have identified different knowledge management processes that allow organizations to manage external and internal knowledge more efficiently. For the development of the present work, it was considered the model presented by Lawson (2003), where six knowledge processes are defined (Creation, Capture, Organization, Storage, Dissemination, Application). Efficient knowledge transfer in project environments requires a holistic understanding of knowledge processes since these processes, defined by Lawson (2003) and other authors, are deemed foundational to successful knowledge sharing.

To reduce the high rate of project failures, organizations must proactively address challenges during project development. Applying knowledge from past projects is crucial in this process. However, time constraints and demanding project timelines often hinder team members from adequately documenting project-specific knowledge. This lack of

Table 1
Soft skills referenced in the literature, regarding project success.

Soft skills	Communication	Conflict Management	Leadership	Team building	People skills	Problem- solving
Awan et al. (2015)	✓	✓		✓		✓
Müller et al. (2012)			✓			
Maqbool et al. (2017)	✓	✓	✓	✓	✓	
Araújo and Pedron (2015)	✓				✓	
Tahir (2020)	✓			✓		✓
Sandhu (2018)	✓	✓		✓	✓	
Stevenson and Starkweather (2010)	✓		✓			
Skulmoski and Hartman (2008)	✓	✓	✓			✓
Creasy and Anantatmula (2008)	✓	✓				
Frese and Sauter (2014)	✓					

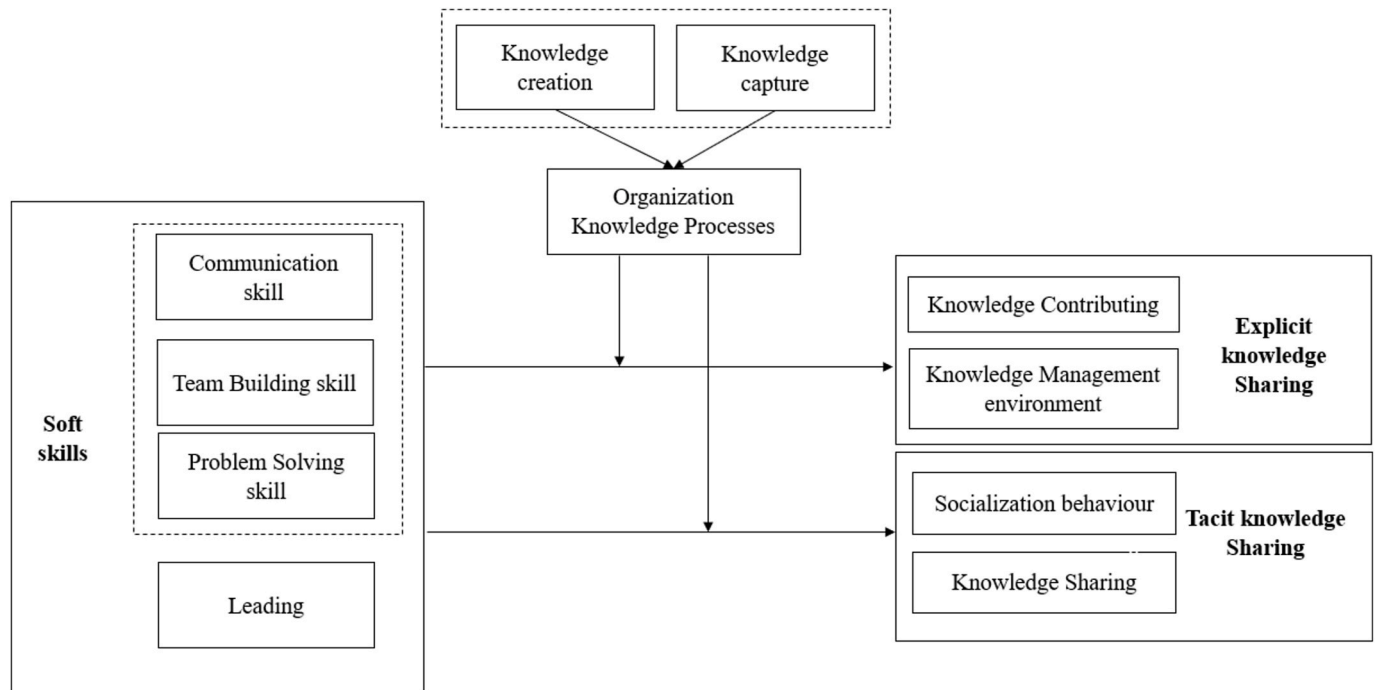


Fig. 1. Study variables and their relationships.

documentation prevents organizations from leveraging valuable knowledge in the future. Therefore, efficient knowledge transfer relies on effective documentation and in project team members collaboration in knowledge-sharing activities, particularly for explicit knowledge that can be structured and documented tangibly (Egbu, 2001; Hanisch et al., 2009).

Sharing tacit knowledge can also be challenging for project members, due to its experiential nature and time-bound constraints. The limited duration of projects may not provide sufficient time to develop the level of trust necessary for effective tacit knowledge sharing. This knowledge comprises subjective insights, intuitions, and perceptions rooted in an individual’s experiences. Successful sharing depends on the relationships established between people, which require a significant level of trust (Egbu, 2001; Juanru Wang and Jin Yang, 2017). Project managers must therefore identify and employ strategies to overcome these challenges and promote tacit knowledge sharing within project teams, despite the constraints imposed by project timelines (Alvarenga et al., 2020; Hanisch et al., 2009).

Considering knowledge as a valuable organizational asset, project managers play a vital role in fostering an environment where knowledge creation and sharing are prioritized to meet team and organizational objectives. Therefore, it is essential for managers to identify knowledge management elements within the organization. This enables them to detect potential issues that could obstruct effective knowledge sharing

among the team members (Adzmi and Hassan, 2018; Dinh et al., 2016; Gheni et al., 2017).

Alavi et al. (2005) conducted a study to investigate the cultural influence of the organization concerning knowledge management practices. They concluded that knowledge management leaders play a decisive role in this process. This research also examined the crucial role of top management in empowering and legitimizing leaders. It concluded that the leadership of individuals promoting knowledge sharing is more essential than creating incentives and bonuses to encourage such sharing. Therefore, providing appropriate tools for knowledge management leaders is more important and influential than encouraging employees to share through incentives and bonuses. One of the authors’ suggestions for future research was identifying the main characteristics and skills KM leaders need to develop a knowledge sharing environment.

2.1.1. The organizational culture

In recent decades, the growing relevance of the relationship between the organizational environment and knowledge management has become a topic of interest in the academic and research world. The current competitive and rapidly changing market has prompted organizations to recognize the importance of knowledge management strategies. By valuing external knowledge as much as internal knowledge, these strategies can help an organization achieve its aims and objectives

more efficiently (Ranf and Herman, 2018). A literature review on knowledge management in organizations concluded that KM is not only a key factor in achieving and maintaining organizational competitiveness but also aids in developing and improving business strategy (Si Xue, 2017).

Numerous projects generate extensive knowledge on best practices, overcoming barriers, and guidelines for effectively managing a particular project type or resolving technical challenges. In addition to the knowledge generated during the project life cycle, the tacit knowledge owned by project members – everyone’s unique expertise – must also be considered an asset for project management. Hence, organizations and managers are beginning to realize the importance of managing existing knowledge and optimizing it through knowledge sharing, thereby enhancing the overall knowledge within the company (Dinh et al., 2016; Hanisch et al., 2009).

A study developed to analyse the relationship between organizational culture and knowledge-sharing practices in project environments concluded that organizational culture is significantly correlated with knowledge sharing in project environments. Organizational culture refers to the shared values, beliefs, and practices that shape the behavior of individuals within an organization. It encompasses the way people interact, make decisions, and collaborate (Ajmal et al., 2009; Alavi et al., 2005; Lawson, 2003). It also concludes that project managers play an important role in this relationship, since they should “harmonize knowledge sharing practices with organization culture” (Ajmal et al., 2009).

A robust knowledge infrastructure is essential to ensure optimal, and natural learning processes in organizations. This infrastructure should have three key components: management, organization, and technology. The management dimension is responsible for creating an organisational memory by ensuring that data, information, and knowledge gained by employees during their tenure are accumulated and retained within the organization. The organisational dimension should motivate members to learn and share knowledge within and between organizational units. Lastly, the technological dimension should provide tools and systems that support the organization’s objectives. (Dinh et al., 2016).

The lack of successful results for knowledge management within project environments has led to deep research into the success factors of knowledge management. Among these factors, top management, bureaucratic processes, infrastructures, strategies applied, and the company’s culture were critical, with the last being the most important. Even if an organization works to establish reliable infrastructures and efficient processes, knowledge sharing and reuse will barely exist if the company’s environment does not reflect a knowledge-sharing culture (Dinh et al., 2016).

Although it requires structured guidelines, knowledge management cannot rely solely on processes. Therefore, it is essential to ensure the entire dimension of knowledge and its sharing aligns with the organization’s principles and culture. This alignment is expected to foster the acceptance and adoption of activities that effectively promote knowledge sharing and management. To guarantee effective knowledge management, relying solely on processes and guidelines is insufficient; organizational culture and social networks also play a crucial role. Considering this, it is essential to align the organization’s principles and culture with knowledge sharing and management, fostering an environment that encourages the acceptance and adoption of activities facilitating these processes (Ajmal et al., 2009; Dinh et al., 2016). Therefore, to see whether organisational culture influences the relationship between the project manager soft skills and knowledge sharing, the second hypothesis was defined.

H2. The organization’s knowledge processes moderate the relationship between each soft skill and knowledge sharing.

This hypothesis aims to analyse the relationship between soft skills and knowledge sharing and to ascertain whether this relationship is

more pronounced in organizations with policies that encourage knowledge creation and capture (Dinh et al., 2016).

3. Method

3.1. Procedures and sample

A questionnaire with 44 questions (15 corresponding to soft skills, 16 to tacit and explicit knowledge sharing and 8 to knowledge management processes, and four were related to sociodemographic characteristics of the participants). A pre-test was first conducted with 12 participants and responses did not reveal any common difficulty in understanding the items. The questionnaire was then constructed via Google Forms and was shared on LinkedIn and software development groups. The target population was composed of individuals working within technology companies, specifically in the field of software development and project management. Participants who agreed to respond were also asked to disseminate the questionnaire to their contacts in the study area. This approach is consistent with the concept of culturally agile individuals and the dynamics of transnational team functioning, as highlighted by Caligiuri and Caprar (2022). Given the interconnected nature of the technology landscape and the prevalence of transnational teams, the sample had ended up including participants from six countries.

3.1.1. Participants

The sample consisted of 201 participants. Ages ranged from 18 to 58 years old ($M = 31.05$, $SD = 8.36$), and 55.7% were male. Approximately 44% had less than five years of experience. They were characterized by a diverse group of professionals, including developers, managers, designers, and others involved in the software development life cycle. They worked in different countries: 46.8% in Portugal, 12.9% in the Netherlands. The remaining 40% include Brazil, Denmark, Scotland, and Germany.

3.2. Measures

3.2.1. Soft skills

The soft skills concept included four components: communication, team building, problem-solving and leading skills. The first three are together (Fig. 1) because their scales were taken from the same study Shi and Chen (2006). In turn, the leading soft skill scale was taken from a different study (Bender, 2014). Communication skills were measured by the three items proposed by the mentioned authors (e. g., “How are the written communication skills of your project Leader?” and “How are the comprehensive skills of your project leader?”). A 5-point Likert scale ranging from 1 (very good) to 5 (very bad) was used. The team building skills name has been adapted from the original name, “Team building and delegation skills”, because the component delegation was not considered in the current study. Three items were used “How good are the team structuring skills of your project leader?“, “How good are the skills of your project leader in identifying the abilities of project team members?” and “How good are your project leader’s integration skills?“. Also, for problem-solving skills was necessary to restrict the original designation – “Problem-finding analysing and solving skills” – as the items related to problem-finding and analysing were not considered. Therefore, two items remained: “How good are the problem-solving skills of your project leader?” and “How good are the judgment and decision-making skills of your project leader”. To guarantee that the obtained empirical data was adjusted to three factors, an exploratory factorial analysis was conducted. After proving the factorability of the input matrix ($KMO = 0.92$, $\chi^2 (28) = 1150.27$, $p < 0.001$) a principal axis factoring (PFA), with varimax rotation, showed that the items were loading better on their expected factors. The factor loadings (Hair et al., 2010, 2018) ranged from 0.50 to 0.81. The internal consistency of each subscale was very good (α communication skills= 0.89 , α team building skills= 0.83 , α problem-solving skills= 0.86 , Kline, 2016). To measure the

component leading the Project Manager Competency Development Framework (Bender, 2014) five items concerning leadership competence were used (e. g., “My project leader creates a team environment that promotes high performance”, “My project leader builds and maintains effective relationships”). Responses were given on a five-point rating scale, ranging from 1 (strongly disagree) to 5 (strongly agree). A PFA was also conducted ($KMO = 0.89$, $\chi^2(10) = 703.62$, $p < 0.001$). A reliable one-dimensional solution was obtained ($\alpha = 0.92$) with factor loadings ranging from 0.76 to 0.88.

The concept of people skills is a composite construct derived from various dimensions found in the reviewed articles (Table 1). For instance, Maqbool et al. (2017) investigated attentiveness, defining it as the ability to engage with others and the attention given to them. Araujo and Pedron (2015) explored people skills such as the ability to maintain positive relationships with others, particularly team members. Sandhu did not specify the definition of emotional intelligence used but included it in people skills, considering these skills as the capability to interpret and respond to the emotions of others (Sandhu, 2018). Consequently, the holistic nature of people skills, which encapsulates diverse dimensions, led to its exclusion as a subject of inquiry within the questionnaire. Also, in what concerns conflict management dimension, the analysis of the results dua PCA solution supported by Kaiser’s criteria extracted one component. A final note to mention that with regard to the conflict management dimension, the analysis of the pre-test results led to it being excluded.

3.2.2. Explicit knowledge sharing

Seven items taken from two scales were used to measure the sharing of explicit knowledge. Four items from Simon Cleveland (2014) scale (e. g.: “I use the ICT system to tell my colleagues when I’ve learned something new about doing my job”, “I use the ICT system to share knowledge I have with my colleagues”) were included and were measured on a 7-point scale ranging from 1 (strongly disagree) to 7 (strongly agree). Three items from the Jay Liebowitz and Isaac Megbolugbe (2003) scale were also included, and the answers were given on a 5-point rating scale (1 = strongly agree to 5 = strongly disagree). Based on a theoretically guided choice, three of the nine items were identified for this research (“There are lessons learned and best practices repositories within my organization”, “We have a high percentage of teams with shared incentives whereby the team members share common objectives and goals” and, “There are online communities of practice in my organization where we can exchange views & ideas”). To ensure that the two sets of items corresponded to two distinct factors, a principal axis factoring was applied. After checking the suitability of performing a factor analysis ($KMO = 0.73$, $\chi^2(21) = 503.35$, $p < 0.001$), two factors were extracted using Kaiser’s criterion. Significant factor loadings (Hair et al., 2010, 2018) were obtained for knowledge contribution and knowledge management environment (loadings ranged between 0.58 and 0.86 and between 0.70 and 0.73, respectively). The reliability of the factors was guaranteed ($\alpha_{\text{knowledge contributing}} = 0.83$, and $\alpha_{\text{knowledge management environment}} = 0.76$, Kline, 2016).

3.2.3. Tacit knowledge sharing

The concept of tacit knowledge sharing was composed of two dimensions. Knowledge socialization behaviour was assessed by four items taken from the study developed by Juanru Wang and Jin Yang (2017). Sample items include “I often talk about my job experience or know-how with other members” and “I actively exchange ideas with colleagues”. The two items were rated on a 5-point Likert scale (1 = strongly disagree to 5 = strongly agree). The measurement of knowledge sharing was supported by the items available in the study by Chunjiang Yang and Aobo Chen (2014). These authors have adopted items from Bock and Kim’s (Breaking the Myths of Rewards: An Exploratory Study of 30 Attitudes about Knowledge Sharing). These items were used to study tacit knowledge sharing, as they are related to knowledge sharing through face-to-face interactions. Five of the eight items were used: “In

daily work, I take the initiative to share my work-related knowledge with my colleagues”, “I keep my work experience and never share it out with others easily”, “After learning new knowledge useful to work, I promote it to let more people learn it”, “I never tell others my work expertise unless it is required in the company”, and “In the workplace I present my knowledge to share with more people”. The answers were given on a seven-point scale, ranging from 1 (strongly disagree) to 7 (strongly agree). After checking the accuracy of the matrix ($KMO = 0.80$, $\chi^2(36) = 782.75$, $p < 0.001$), two reliable PFA factors were obtained ($\alpha_{\text{socialization behaviour}} = 0.84$ and $\alpha_{\text{acceptable for knowledge sharing}} = 0.75$).

3.2.4. Knowledge capture and creation

The knowledge creation and capture measurements were taken from a study conducted by Juanru Wang and Jin Yang (2017), who developed the Knowledge Management Assessment Instrument. These researchers analysed the processes defined by other authors and created the cycle they considered most appropriate, consisting of six phases: knowledge creation, knowledge capture, knowledge organization, knowledge storage, knowledge dissemination, and knowledge application. This is in line with what was mentioned in the literature review, where it was stated that this research considered the model presented by Lawson (2003), which describes these six phases. Capture and creation were the processes chosen for analysis, each containing four items: (i) “My organization has mechanisms for creating and acquiring knowledge from different sources such as employees, customers, business partners and competitors”, (ii) “My organization encourages and has processes for the exchange of ideas and knowledge between individuals and groups”, (iii) “My organization responds to employees’ ideas and documents them for further development”, and, (iv) “My organization has mechanisms in place to absorb and transfer knowledge from employees, customers and business partners into the organization”. The items were measured on a five-point Likert scale ranging from 1 (strongly agree) to 7 (strongly disagree). Since the authors analysed both processes separately, the factorial analyses were also conducted separately. The factorability of the data was verified ($KMO = 0.80$, $\chi^2(6) = 366.84$, $p < 0.001$ and $KMO = 0.83$, $\chi^2(6) = 397.39$, $p < 0.001$, for creation and capture respectively). Each AFP extracted only 1 factor and with recognized reliability ($\alpha_{\text{creation}} = 0.85$ and $\alpha_{\text{capture}} = 0.87$, Kline, 2016). Fig. 1 shows the relationship between all the study variables.

3.2.5. Measurement model and common method variance

To check whether the data reflected the common method variance (CMV), given that the data was self-reported, the recommendation of Podsakoff et al. (2003) was followed. Firstly, the adequacy of the measurement model to the sample data was assessed using confirmatory factor analysis (CFA). Several criteria were used to assess the adequacy of the model, including the Chi-square (χ^2) and Normed Chi-square (χ^2/df) with recommended cut-off values of ≤ 2 to 3 (Schreiber et al., 2006), the Comparative Fit Index (CFI > 0.95) (Hu and Bentler, 1999; Kline, 2016), the Tucker–Lewis Index (TLI > 0.94), and the Root Mean Square Error of Approximation (RMSEA ≤ 0.08) (Hair et al., 2010, 2018). The results showed a good fit between the sample data and the factor structure proposed for the study variables ($\chi^2(573, N = 203) = 825.085$, $p < .001$; $\chi^2/df = 1.440$; CFI = 0.944; TLI = 0.935; RMSEA = 0.047). Then, in accordance with Podsakoff et al. (2003), a latent factor representing the variance of the common method was introduced into the measurement model, allowing that all items were assigned loadings onto their respective theoretical constructs, as well as onto a latent factor representing common method variance (CMV). In conclusion, the fit statistics with and without CMV were compared. The model with the CMV factor had the worst fit indices ($\chi^2(547, N = 203) = 931.474$, $p < .001$, $\chi^2/df = 1.703$; CFI = 0.915; TLI = 0.896; RMSEA = 0.059). The Akaike Information Criterion (AIC) increases from 1171.388 to 1243.474, which leads to a worse fit. In addition, the model without the CMV factor showed a significant reduction in the χ^2 ($\Delta\chi^2(26) = 106.389$, $p < .001$). It is therefore very likely that common method

variance did not affect the results.

3.3. Data analysis

In the first phase, data compilation and data screening were carried out. Then, a descriptive analysis was conducted (mean, standard deviation) and correlations between the study variables. To test **Hypothesis 1** a multiple linear regression was performed between the four predictors: communication, team building, problem-solving and leading and the dependent variables: knowledge contributing, knowledge management environment, socialization behaviour, and knowledge sharing. To test **Hypothesis 2** on moderation, the PROCESS v.4.1 SPSS macro developed by Hayes (2020) was used. To probe two-way interactions in the linear regression, a simple slope test was performed, and interactions were plotted at -1SD and +1SD from the means of knowledge capture and creation, as recommend by Aiken and West (1991).

4. Results

Table 2 presents the mean and standard deviation for all the study variables, as well as their correlations. As **Table 2** shows, the first three soft skills presented (approximately) medium correlations (Cohen, 2016) with the knowledge management environment outcome. The leading soft skill showed the highest correlations with the remaining three outcomes, also with a medium correlation between leading and contributing to knowledge ($r = 0.34, p < 0.001$).

Hypothesis 1. (H1) assumed that the project manager’s soft skills are associated with explicit and tacit knowledge sharing. To test **H1** four multiple linear regression models were performed using the four soft skills (communication, team building, problem-solving and leading) as predictor variables and each of the outcomes: knowledge contributing, knowledge management environment, socialization behaviour, and knowledge sharing. **Table 3** shows that, except for the outcome knowledge management environment with no significant associations ($p > .05$), only leading presented a significant and a positive association on knowledge contributing ($\beta = 0.36, t = 5.20, p < .000$), on socialization behaviour ($\beta = 0.25, t = 3.41, p < .000$) and on knowledge sharing ($\beta = 0.25, t = 3.48, p < .000$). Thus, **Hypothesis 1** was only partially supported.

Hypothesis 2. (H2) stated that the organization’s knowledge processes moderate the relationship between each soft skill and knowledge sharing. The interaction effect between the problem-solving skill and knowledge creation significantly contributed to knowledge management environment ($B = 0.14, t = 3.01, p = .003, \text{Table 4}$). Knowledge capture also had a significant moderating effect on the relationship between problem-solving skill and knowledge management environment ($B = 0.16, t = 3.15, p = .002, \text{Table 4}$). Thus, **Hypothesis 2** was supported.

The interaction between the problem-solving skill and knowledge

Table 2
Descriptive statistics, reliability, and correlation between study variables.

	Mean	SD	1	2	3	4	5	6	7	8	9	10
1. Communication	2.34	1.06	(0.89)									
2. Team building	2.43	0.92	0.75***	(0.83)								
3. Problem solving	2.33	1.08	0.74***	0.76***	(0.86)							
4. Leading	5.02	1.41	-0.28***	-0.20**	-0.20**	(0.92)						
5. Knowledge contributing	4.91	1.41	-0.02	0.04	0.06	0.34***	(0.83)					
6. Knowledge Management environment	2.75	0.96	0.26***	0.29***	0.30***	-0.08	-0.07	(0.76)				
7. Socialization Behaviour	3.67	0.89	-0.03	0.03	0.01	0.24***	0.32***	0.05	(0.84)			
8. Knowledge sharing	4.18	0.77	0.03	0.08	0.06	0.22**	0.35***	0.06	0.22**	(0.75)		
9. Knowledge creation	2.87	0.99	0.29***	0.34***	0.076***	-0.12*	-0.10	0.52***	0.02	0.03	(0.85)	
10. Knowledge capture	2.82	0.98	0.25***	0.32***	0.25***	-0.12*	-0.10	0.48***	0.01	0.05	0.80***	(0.87)

Note. N = 201. Cronbach alpha is reported in parentheses.
* $p < 0.05$ ** $p < 0.01$ *** $p < 0.001$.

Table 3
Regression results for explicit knowledge sharing and tacit knowledge sharing.

	Explicit knowledge Sharing		Tacit Knowledge Sharing	
	Knowledge Contributing	Knowledge Management Environment	Socialization Behaviour	Knowledge Sharing
	Beta	Beta	Beta	Beta
Communication	-0.07	0.20	-0.04	0.01
Team building	0.05	1.21	0.09	0.10
Problem-solving	0.14	1.51	0.02	0.03
Leading	0.36***	-0.09	0.25***	0.25***
R ² a =	0.12	0.08	0.04	0.05
F (4, 198) =	7.63***	5.35***	3.22***	3.65***

Note. N = 201.
*** $p < 0.001$.

Table 4
Regression results for moderation.

	Knowledge Management Environment	
	B	SE
Problem-solving skill	0.12*	0.06
Knowledge creation	0.48***	0.06
Problem solving skill X knowledge creation (interaction effect)	0.14**	0.05
Model	R ² = 0.34	F (3, 199) = 38.85
Problem-solving skill	0.14*	0.06
Knowledge capture	0.44***	0.06
Problem solving skill X knowledge capture (interaction effect)	0.16**	0.05
Model	R ² = 0.30	F (3, 199) = 28.88

N = 201. Unstandardized regression coefficients are reported.

* $p < 0.05$. ** $p < 0.01$. *** $p < 0.001$.

(creation and capture) was then explored by conducting a simple slope test (Aiken and West, 1991), which was also plotted (Figs. 2 and 3). For low knowledge creation (1 SD below the mean) the relationship between the problem-solving skill and the knowledge management environment was not significant (simple slope = -0.02, $t = -0.25, p > 0.05$) However, for higher knowledge creation (1 SD above the mean) the relationship was positive, significant, and stronger (simple slope = 0.26, $t = 4.21, p < 0.001$). Thus, the knowledge creation moderator reinforced the relationship between the problem-solving skill and the knowledge management environment.

Under low knowledge capture (1 SD below the mean) the relationship between the problem-solving skill and the knowledge management environment was not significant (simple slope = -0.02, $t = -0.21, p >$

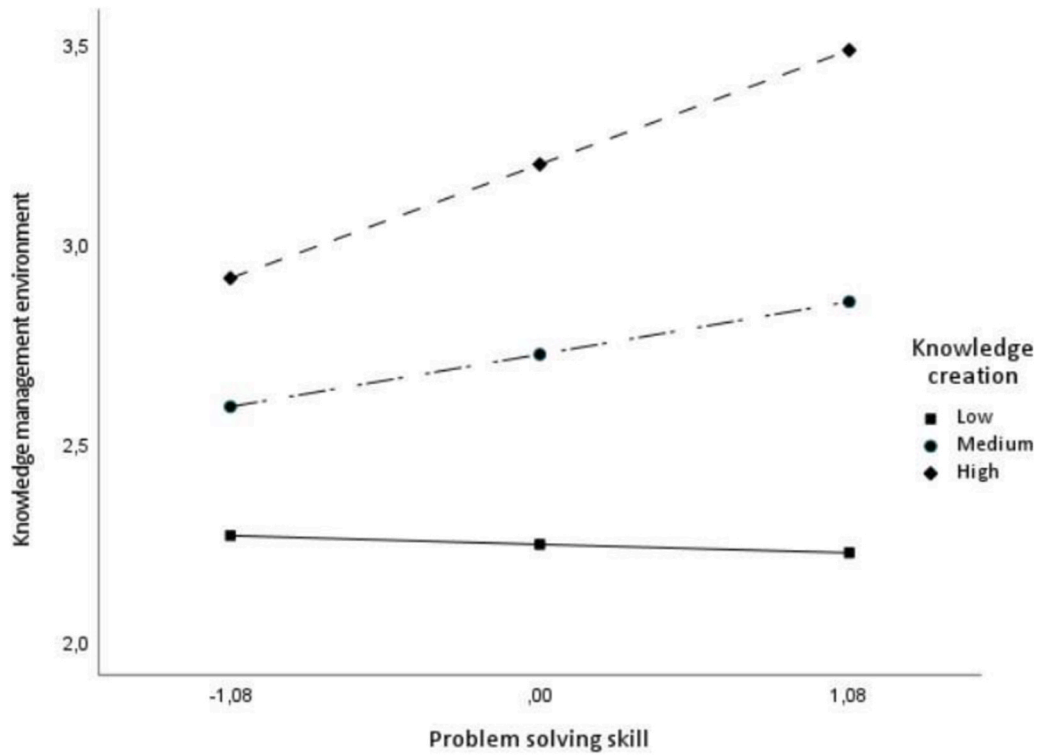


Fig. 2. The moderating effect of knowledge creation on the relationship between the problem-solving skill and the knowledge management environment.

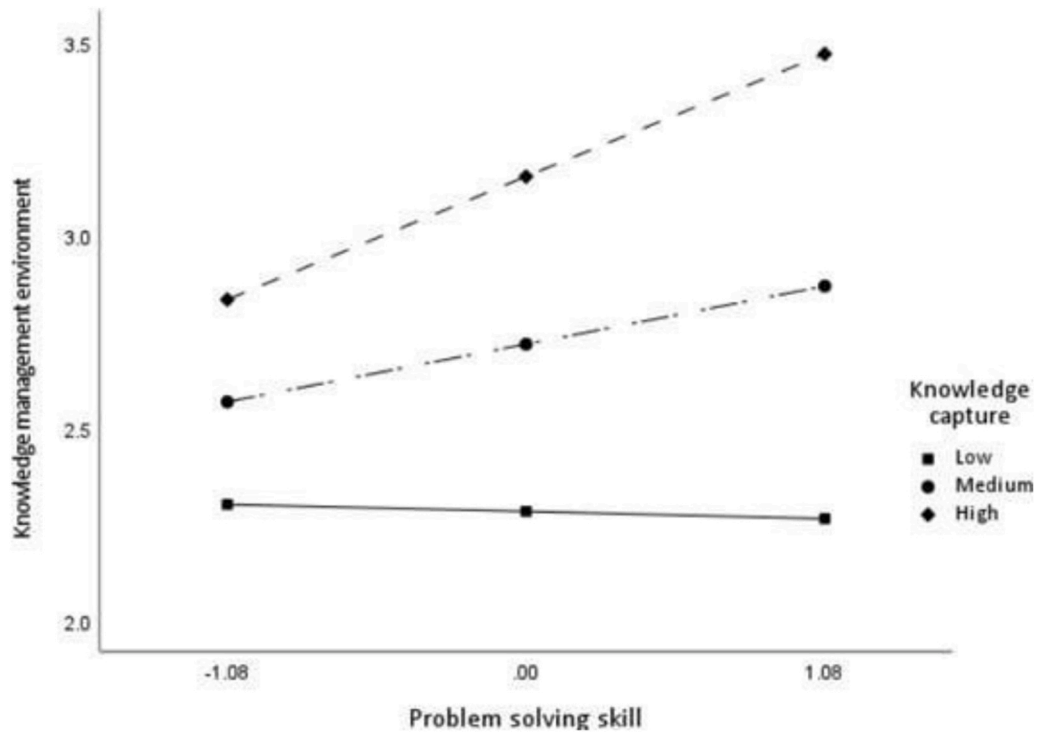


Fig. 3. The moderating effect of knowledge capture on the relationship between the problem-solving skill and the knowledge management environment.

0.05). Nevertheless, under higher knowledge capture (1 SD above the mean) this relationship was positive, significant, and stronger (simple slope = 0.30, $t = 4.45$, $p < 0.001$). Thus, as the moderator increases, the relationship between problem solving ability and the knowledge management environment was also reinforced.

5. Discussion

This research aimed to analyse the association between project manager soft skills and tacit and explicit knowledge sharing, as well as the moderating effect of the organizational environment on this relationship. To achieve these objectives, this research endeavored to

address two propositions: (P1) the key importance of project managers' soft skills in project success; and (P2) the relevant role of the organizational context in promoting a culture of knowledge sharing. To analyse H1, the relationship between the soft skills under analysis (communication, team building, problem-solving and leading) and each of the outcomes: knowledge contributing and knowledge management environment (used to measure the explicit knowledge sharing concept), and socialization behaviour and knowledge sharing (used to measure the tacit knowledge sharing concept) were tested. The findings showed that leading soft skill was positively and significantly associated with knowledge contributing, socialization behavior, and knowledge sharing. No association was found between leading soft skills and knowledge management environment. Furthermore, no significant relationships were found between soft skills (communication, team building, problem-solving) and explicit and tacit knowledge sharing outcomes (knowledge contributing, knowledge management environment, socialization behavior, and knowledge sharing). These results partially support Proposition P1, suggesting that while certain soft skills, particularly leadership, play a significant role in facilitating knowledge sharing, other soft skills may not have the same impact.

The research conducted by Ajmal et al. (2009) carried out to study how organizational culture could help in knowledge sharing activities within the project, mentioned the crucial role of managers in encouraging behaviors such as exploration and experimentation, also referring to the positive influence of communication in the success of knowledge sharing practices. Considering the increasingly crucial role that communication plays nowadays, it was expected to obtain results that would support the relationship between this soft skill and some of the knowledge sharing variables. However, the obtained results only showed a positive influence of the leading soft skill, while the remaining results obtained, including the study of the influence of communication, were non-significant.

This contribution reinforces the conclusions presented in the literature, which indicate that project management is a determining factor in promoting knowledge sharing within the project (Badewi, 2016), and that the project manager's role in promoting knowledge sharing is a catalyst for increasing sharing within the team and involvement in the success of the project (Mueller, 2012). In addition, it sheds new light on the research, emphasising the role of soft skills, already considered important in the manager's performance for the success of the project (Fareed et al., 2021; Alvarenga et al., 2020; Maqbool et al., 2017; Awan et al., 2015), in the promotion of knowledge sharing within the team, particularly regarding leadership skills.

The moderating effect was checked against the knowledge creation and capture process (H2). These results therefore showed the importance of an organizational culture that incorporates the practices of creating and capturing knowledge, since this will increase the positive relationship between the project manager's soft skills and explicit knowledge sharing. The insights from this study revealed that organizational culture, namely the processes of creating and capturing knowledge, encourages knowledge sharing. This aligned with the conclusions presented in the study developed by Owen (2008), who stated that continuous learning (based on knowledge management) is essential for project success. In addition, Ismail et al. (2011) concluded that sharing knowledge among members of project management is vital to project success. These results support P2, while it is recognized that having an organisational environment that prioritizes knowledge management practices fosters knowledge sharing.

6. Conclusion, limitations, and future work

Knowledge sharing and knowledge management are critical for organizations, with implications for project success (Dinh et al., 2016; Reich et al., 2012; Liebowitz and Megbolugbe, 2003). In parallel, the literature also points out project manager performance (Irfan et al., 2021; Gheni et al., 2017; Adzmi and Hassan, 2018; Dai and Wells, 2004;

Munns and Bjeirmi, 1996) as a relevant contributor to project success. This study proposes an approach that highlights the role of the project manager as a key actor in creating a knowledge-sharing environment. This research aims to analyse the relationship between the project manager's soft skills and knowledge sharing. The focus on soft skills aligns with literature underscoring their significance in project success (Fareed et al., 2021; Alvarenga et al., 2020; Maqbool et al., 2017; Awan et al., 2015; Muller and Turner, 2010), claiming the primacy of soft skills over hard skills (Marnewick and Marnewick, 2021; Araújo and Pedron, 2015; Stevenson and Starkweather, 2010; Creasy and Anantatmula, 2008; Skulmoski and Hartman, 2008), and pointing out the scarcity of studies addressing them (Millhollan et al., 2016).

The results indicated that leadership skills are positively associated with outcomes such as knowledge contributing, socialization behavior, and knowledge sharing. This suggests that a project manager with more leadership abilities encourages knowledge sharing among team members in information systems, connected to explicit knowledge, and face-to-face interactions, reflecting tacit knowledge sharing. Findings suggest that project manager leadership skills positively influence both explicit and tacit knowledge sharing. While communication, team building, and problem-solving skills showed no significant association with knowledge sharing in this study, the results highlight the importance of leadership in fostering knowledge transfer within project teams. Therefore, findings from this study underscore the significance of project managers' leadership skills as a driving force in promoting knowledge sharing within teams among the soft skills examined. This conclusion introduces a fresh perspective on knowledge sharing, placing significant emphasis on the project manager's leadership skills and assigning them a key responsibility. Reinforcing the insights of prior research on the necessity to train and prepare project managers in soft skills, as underscored by Fareed et al. (2021) and Muller and Turner (2010), this study innovatively connects the importance of soft skills in fostering knowledge sharing within project teams.

Furthermore, this study highlights that while the project manager's leadership skills are important for motivating and engaging the team in committing to knowledge sharing, it is recognized that knowledge sharing within projects extends beyond the confines of project teams. Rather, it necessitates seamless integration into a holistic organizational knowledge management and dissemination framework. The moderating effect of organisation knowledge processes was found on the relationship between project management's problem-solving skills and knowledge management environment. Knowledge creation and capture reinforced the relationship between problem-solving soft skills and knowledge management environment. These results highlight the importance of the organisation's role in defining organisational processes that foster a culture of knowledge sharing.

In summary, the findings suggest organizations experiencing knowledge-sharing challenges within the context of projects could pursue a holistic strategy to foster an organisational culture of knowledge-sharing and management. Such an approach, provides a foundation through leadership skills for the project manager to encourage knowledge-sharing among the team. Since leadership emerges as a soft skill impacting a project manager's performance in knowledge sharing, it becomes a relevant factor in selecting project managers, especially for projects where knowledge sharing is critical. Leadership is, therefore, a skill to be strengthened in the training plans of both organizations and project managers.

Considering these results, several limitations should be noted and addressed in future work. Since obtaining a probabilistic sample was impossible, inferences are not allowed. Thus, in this sense, the study should be replicated with other transnational samples. In addition, it would be interesting to also explore from the project manager's perspective, as it could shed light on potential differences between team members' and project manager's perceptions. Another topic for future work could be to understand whether the relationship changes according to the gender of the project manager. Regarding moderation, it

might be valuable to measure the moderating effect of the other processes that make up the knowledge management, as knowledge organization, knowledge storage, knowledge dissemination, and knowledge application, since only two of them were considered in this study.

CRedit authorship contribution statement

Inês Avença: Writing – review & editing, Writing – original draft, Validation, Supervision, Resources, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Luísa Domingues:** Writing – review & editing, Validation, Supervision, Resources, Methodology, Investigation, Conceptualization. **Helena Carvalho:** Writing – review & editing, Validation, Supervision, Software, Methodology, Investigation, Formal analysis, Data curation, Conceptualization.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

The authors are unable or have chosen not to specify which data has been used.

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