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A Meta-Analysis of Horizontal Leadership and Knowledge Sharing

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Abstract

In the era of knowledge economy, knowledge sharing is one of the important factors for organizational success, meanwhile, horizontal leadership is becoming a trend in team leadership. This study conducted a meta-analysis of 23 studies involving 7119 participants to examine the effects of two types of horizontal leadership (shared leadership, and distributed leadership) on knowledge sharing, and the contextual moderators of the horizontal leadership-knowledge sharing relationship. Findings revealed that both shared and distributed leadership had a positive impact on knowledge sharing and no significant difference existed. Therefore, these two concepts have conceptual redundancy in predicting knowledge sharing. National culture (masculine, long-term orientation, uncertainty avoidance) moderated the relationship between horizontal leadership and knowledge sharing. Specifically, the relationship is stronger in feminine, high uncertainty avoidance, and long-term orientation national cultures, which enriched the boundary conditions for the impact of horizontal leadership on knowledge sharing.

Keywords Knowledge sharing, Horizontal leadership, Distributed leadership, Shared leadership, Meta-analysis

1. Introduction

In the knowledge economy era, the enthusiasm of employees for knowledge sharing plays a crucial role in organizational success. Knowledge sharing refers to the behavior of employees actively exchanging their knowledge and experiences with other members within the organization (Bock et al., 2005). Previous studies have consistently

demonstrated the positive effects of knowledge sharing on fostering organizational learning, cultivating organizational innovation, and enhancing overall organizational performance (Zhao et al., 2023), and leadership plays a critical role in this process. Meanwhile, work teams increasingly distribute functional leadership roles to members in areas in which those members have requisite talent (Danni et al., 2014; Pearce, 2004). This trend has led scholars to shift their attention from vertical leadership to horizontal leadership (Denis et al., 2012). Unlike vertical leadership, the leadership roles and influence of horizontal leadership are distributed among team members (Pearce, 2004). Consequently, there is a growing recognition of the advantages of adopting horizontal leadership to facilitate employee knowledge sharing (Martine et al., 2019). Pearce (2004) argued that ever more difficult for any leader from above to have all of the knowledge, skills, and abilities necessary to lead all aspects of knowledge work. Thus, studying horizontal leadership contributes to our understanding of the intricate relationship between leadership and knowledge sharing (Martine et al., 2019). Numerous studies have explored the relationship between horizontal leadership (e.g., shared leadership and distributed leadership) and knowledge sharing (e.g., Chen et al., 2022) .

Despite recent growth in research on the relationship between horizontal leadership and knowledge sharing, several questions remain unanswered. Firstly, the extent to which horizontal leadership influences knowledge sharing remains unclear. The correlation coefficient between horizontal leadership and knowledge sharing varies greatly, ranging from 0.05 (Chen et al., 2022) to 0.68 (Martine et al., 2019). Answering this question will enhance our understanding of the relationship patterns between these variables and provide practical managers with insights into the impact of horizontal leadership on knowledge sharing.

Second, scholars have raised concerns regarding conceptual redundancy within horizontal leadership (D'Innocenzo et al., 2016). The existence of at least two conceptualizations of horizontal leadership, namely shared leadership and distributed leadership, contributes to this concern (D'Innocenzo et al., 2016). Shared leadership emphasizes on mutual leadership among team members (Pearce, 2004), whereas distributed leadership focuses on leadership across different hierarchies and levels (Spillane et al., 2004). Both concepts propose that leadership can emerge from and be shared by team members. While many studies have found positive impacts of both shared leadership and distributed leadership on knowledge sharing, no research has examined whether they differ in their ability to promote knowledge sharing. Exploring

the effectiveness differences between these two concepts can shed light on the issue of redundancy within the horizontal leadership concept.

Third, despite the exploration of certain moderators such as team characteristics and task complexity in the relationship between horizontal leadership and knowledge sharing (Zhu et al., 2018), cultural factors have largely been overlooked. Currently, most empirical studies have primarily relied on samples from a stand-alone country to examine the relationship between horizontal leadership and knowledge sharing (e.g. Martine et al., 2019; Chen et al., 2022). The Cultural Congruence Proposition (House et al., 1997) suggests that leadership behaviors being aligned with the cultural values held by subordinates are more effective. An increasing number of empirical studies have demonstrated that the effectiveness of leadership varies significantly as a result of cultural influences (Gui et al*.,* 2021). However, the extent to which the relationship between horizontal leadership and knowledge sharing is contingent upon national culture remains unclear.

Due to limitations associated with sample selection and time constraints, a stand-alone primary study cannot adequately address the above questions. In order to overcome these limitations and gain a more comprehensive understanding, a meta-analysis can be employed as a systematic aggregation technique. Meta-analysis allows for the scientific integration of diverse research findings, mitigates errors related to measurement and sampling (Aguinis et al., 2011), and enables the exploration of theoretical and methodological inquiries that cannot be addressed by a single primary study. By employing this approach, we aim to bridge the existing gaps by estimating the correlation coefficient between horizontal leadership with different concepts and knowledge sharing. Additionally, we compared the differences regarding to the relationship between shared leadership / distributed leadership and knowledge sharing based on Self-determination theory (SDT). Finally, in view of The Cultural Congruence Proposition (House et al., 1997), we examined the potential moderating role of national cultures (masculinity, uncertainty avoidance, and short-term orientation).

We aim to make three contributions to the existing literature. First, given the notable fluctuations in the magnitude of the relationship between distributed leadership/shared leadership and knowledge sharing as identified by previous studies (Chen et al., 2022; Martine et al., 2019), we conducted an analysis of this relationship based on the self-determination theory (Deci et al., 2017). Our findings could clarify the magnitude of the association between these variables. Second, there exist diverse perspectives regarding the distinction between shared leadership and distributed

leadership, with some scholars asserting differences while others holding alternative viewpoints (Denis et al., 2012; Goksoy, 2016). To address this issue, our study integrates existing literature and compared the relative importance of shared leadership and distributed leadership with relating to knowledge sharing. This endeavor contributes to validating the conceptual uniqueness of these leadership styles. Third, we employed the Cultural Congruence Proposition (House et al., 1997) and the cultural value classification framework (Hofstede, 1980) to examine the moderating effect of national cultures. In doing so, the findings will enrich our understanding of the contextual boundaries under which horizontal leadership influences knowledge sharing.

2. Theory and hypotheses

2.1 Horizontal leadership

Scholars hold diverse perspectives on leadership, and these perspectives are not limited to formally appointed leaders. In contrast to vertical leadership, horizontal leadership emphasizes group leadership, where team members perceive themselves as leaders rather than solely being led by one individual (Denis et al., 2012). Horizontal leadership is characterized by shared group influence, where team members dynamically assume leadership roles in response to team emergencies or task demands (Lyndon et al., 2020). Shared leadership and distributed leadership are two widely used concepts to describe this phenomenon (Fitzsimons et al., 2011). Denis et al. (2012) summarized these terms as leadership functions that emerge through shared or distributed responsibilities within social interactions among group members.

Shared leadership is defined as “a dynamic, interactive influence process among individuals in groups for which the objective is to lead one another to the achievement of group or organizational goals or both” (Pearce & Conger, 2003, p.1). The theoretical foundations of shared leadership stem from the realm of “team-based” leadership literature. Notably, shared leadership emerged as an extension of the concept of individual self-leadership, transitioning towards the team level conceptualization of self-leadership. Unlike traditional leadership models that rely on formal positions or roles, shared leadership draws upon the knowledge and competencies of individuals (Goksoy, 2016). It entails multiple individuals taking on self-leadership while willingly allowing others to lead them through reciprocal influence processes. This perspective views both followers and leaders as team members with equal status, highlighting the importance of mutual leadership within the context of formal and informal relationships established during group activities (Denis et al., 2012; Mi et al., 2023).

Distributed leadership highlights the diffusion of leadership roles and

responsibilities within and across hierarchical levels, emphasizing the interactive nature between leaders, followers, and contextual factors (Spillane et al., 2004). The distributed leadership literature emerged principally within the educational sector. A distinctive characteristic of distributed leadership is the delegation of leadership functions, such as decision-making, to two or more individuals in appropriate situations (Pearce, 2004; Spillane et al., 2004). Distributed leadership makes a clear distinction between the hierarchy of leaders and followers, emphasizing that rotating authority and responsibility across multiple groups of managers produce leadership results (Denis et al., 2012).

Both shared leadership and distributed leadership emphasize that leadership is not confined to a single formal leader, but rather a collective phenomenon. Moreover, these forms of leadership are characterized by their dynamic and fluid nature, arising from the collaborative interactions among team members, including both peers and leaders, and requiring collective engagement (Denis et al., 2012). But Shared leadership primarily results from the mutual influence within a group, where leadership emerges through the utilization of individual knowledge and capabilities (Mi et al., 2023). On the other hand, distributed leadership focuses more on the rotation of power and responsibility across multiple managerial groups (Denis et al., 2012).

2.2 Knowledge sharing

Knowledge sharing refers to the process of exchanging task-related perspectives, information, and suggestions among members within an organization (Huang & Pham, 2022). It is influenced by the motivation, willingness, and ability of the employee (Bavik et al., 2018). According to the attribute of knowledge, knowledge sharing can be divided into explicit knowledge sharing and tacit knowledge sharing (Lin et al., 2022). Explicit knowledge refers to information that is codified and easily articulated, such as documents, work reports, and manuals (Bock et al., 2005). Tacit knowledge, on the other hand, is experiential and intuitive in nature, often requiring frequent social interactions for effective transmission (Bock et al., 2005). Knowledge sharing is a voluntary and proactive behavior that necessitates awareness on the part of individuals(Adil et al., 2023; Santhose & Lawrence, 2023).

2.3 Horizontal leadership and knowledge sharing

Self-determination theory (SDT) suggests that “all human beings have three fundamental psychological needs — for competence, autonomy, and relatedness — which when satisfied promote autonomous motivation, wellness, and effective

performance" (Deci et al., 2017, p. 21). Autonomy refers to the experience of volition and self-recognition towards one's behavior, competence refers to the desire to control one's environment and achieve valuable results within it, and relatedness refers to a feeling of connection with others (Deci et al., 2017). SDT further postulates that the workplace context plays a crucial role in the satisfaction of basic psychological needs. Supportive workplace contexts are beneficial to promote need satisfaction and consequently lead to optimal functioning and well-being (Deci et al., 2017). In addition, numerous studies have demonstrated that self-determination theory is an important mechanism for explaining the impact of leadership behavior on knowledge sharing (Khan et al., 2020).

Shared leadership can positively influence knowledge sharing by facilitating the satisfaction of these needs among employees. First, shared leadership emphasizes self-leading (Fitzsimons et al., 2011), which provides a supportive workplace context. Thus, shared leadership satisfies employees' need for autonomy. When employees feel autonomous, they are more motivated to share their ideas and knowledge with their colleagues (Olatokun & Nwafor, 2012). Second, shared leadership satisfies employees' need for competence by allowing team members to assume leadership roles so that they perceive that they can complete somewhat challenging tasks (Drescher et al., 2014). Need satisfaction, in turn, can energize, direct, and sustain behaviors for knowledge sharing (Gagné & Deci, 2005). Finally, shared leadership encourages communication and collaboration among team members, thereby strengthening social ties and enhancing interpersonal relationships (Pearce & Conger, 2003). Taken together, we expect that:

H1a. Shared leadership positively relates to knowledge sharing.

Distributed leadership encourages team members to take responsibility for decision-making and problem-solving (Spillane et al., 2004), which satisfies the need for autonomy. When organizations and managers actively support autonomy, it leads to the satisfaction of all three basic psychological needs of employees. The first reason is that organizations that support autonomy generally are attuned to and supportive of the other needs, and the second is that when individuals feel a sense of autonomy, they tend to seek opportunities to fulfill their other needs as well (Deci et al., 2017). By distributing leadership responsibilities and functions, organizations enable employees to experience a higher level of autonomy, which in turn can address their competence and relatedness needs (Deci et al., 2017). Previous research has emphasized the significant role of distributed leadership in facilitating knowledge sharing (Chen et al.,

2022). Thus, we propose:

H1b. Distributed leadership positively relates to knowledge sharing.

There are common points between shared leadership and distributed leadership in that, 1) they both emphasize leadership by considering multiple individuals, rather than one person or team (Spillane et al., 2004; Pearce & Conger, 2003); 2) they both result from collective interaction among team members (Denis et al., 2012); 3) they both are dynamic leadership rather than a fixed person leading the team; 4) they both have a positive influence on knowledge sharing (Chen et al., 2022). But there are also differences between shared leadership and distributed leadership. Shared leadership emphasizes skill complementarity, affirming everyone's abilities and being able to directly meet their competency needs (Denis et al., 2012). Distributed leadership stresses responsibility and power rotation, reflecting equal power so that it can be better able to satisfy the need for autonomy (Denis et al., 2012). Shared leadership and distributed leadership have both similarities and differences, but it is currently unclear whether they have greater commonalities or differences. Subsequent research also found inconsistent conclusions, such as Goksoy (2016) found that these leadership concepts were close to one another in meaning and can be used interchangeably. Based on the above logic and contradictory past evidence, we follow the meta-analysis by (Henderson & Horan, 2020) and propose research questions rather than hypothesis:

Research question 1. Is there a difference in the relationship between shared leadership or distributed leadership and knowledge sharing?

2.4 The moderating effect of national culture

National culture is defined as the collective programming of one's mind that distinguishes the members of one group or category of people from another (Hofstede, 1980). National culture affects the effectiveness of leadership (Gui et al., 2021). The Cultural Congruence Proposition (House et al., 1997) suggests that leadership behaviors being aligned with the cultural values held by subordinates are more effective. When leadership behavior aligns with cultural values, employees in an organization may feel more satisfied, engaged, and committed (Rabl et al., 2014). As a result, they may be able or willing to perform well. A large number of studies have addressed the role that culture plays in the relationship between leadership and individual outcomes (e.g. Moser & Deichmann, 2021; Ashok et al., 2021). Therefore, we argue that when horizontal leadership fits well with national culture, the relationship between horizontal leadership and knowledge sharing will be stronger.

Hofstede's research has identified five dimensions of national culture: power

distance, uncertainty avoidance, individualism, masculinity, and long-term orientation (Hofstede, 2001). These dimensions are scored from 0 to 100 for each country or region (www.hofstede insights.com). Previous meta-analyses have also examined the moderating effects of national culture using this framework (Lee et al., 2020). In our study, we operationalized the five dimensions of national culture using survey data from Hofstede (2001). Following coding procedures employed in previous research (Rockstuhl et al., 2012; Gonzalez et al., 2023), samples with values above the median for each cultural dimension were classified as high groups, whereas those with values below the median were categorized as low groups. When conducting the subgroup analysis, it is recommended that each subgroup comprises a minimum of three effect values (Borenstein et al., 2009). In our research, it was noted that subgroups pertaining to low power distance and high individualism each presented only one effect value (k ＜3). Due to the limited sample size for the low power distance subgroup (k=1) and high collectivism (k=1), we chose not to perform subgroup analysis for these two dimensions of national culture. Consequently, we focused solely on analyzing the moderating effects of uncertainty avoidance, masculinity, and long-term orientation.

(1) Masculinity or femininity

Masculinity refers to "the extent to which the dominant values in society are … assertiveness, the acquisition of money and things" (Hofstede, 1980, p.46) while femininity describes the values as "friendly atmosphere, position security, physical conditions, cooperation" (Hofstede, 2001). Countries high in masculinity emphasize task performance and achievement, whereas those with femininity emphasize interpersonal relationships and cooperation. In the organization, the difference between masculinity and femininity is reflected by the motivations the employees work for. Under masculine culture, people are motivated by success, while under feminine culture, they are motivated by life (Hofstede & Minkov, 2010). On the one hand, for leadership in feminine countries, enhancing people's self-determination through participation is a good way to improve team efficiency (Hofstede & Minkov, 2010). Due to horizontal leadership involves team members collectively exerting leadership influence and making decisions (Denis et al., 2012), it is more suitable for cultures with high levels of femininity. On the other hand, highly masculine cultures place more focus on individual competitiveness, while horizontal leadership focuses on the opposite (Hofstede & Minkov, 2010). Horizontal leadership emphasizes that leadership is not a monopoly or responsibility of one person, but a collective process (Lyndon et al., 2020). Therefore, according to the Cultural Congruence Proposition (House et al., 1997), we

propose that the relationship between horizontal leadership and knowledge sharing is stronger in feminine cultures than that in masculine cultures.

H2a. Masculinity and femininity national culture moderate the relationships between horizontal leadership and knowledge sharing such that those relationships are stronger in feminine national cultures than in masculine cultures.

(2) Uncertainty avoidance

Uncertainty avoidance refers to the extent to which individuals feel threatened or uncomfortable in ambiguous and uncertain situations (Hofstede, 1980). The culture of high uncertainty avoidance emphasizes stability, predictability, risk avoidance, and fear of future unknowns (Hofstede, 1980). In organizations with horizontal leadership, the generation of leadership depends to some extent on the professional knowledge of members (Denis et al., 2012), while people in countries with high uncertainty avoidance can plan and reduce ambiguity by sharing professional knowledge in advance (Hofstede & Minkov, 2010; Moser & Deichmann, 2021). In addition, horizontal leadership emphasizes collective work for organizational goals (Goksoy, 2016), while countries with higher scores in uncertainty avoidance share the same view of actively supporting others' common goals because such support helps maintain social systems and avoid uncertainty (Moser & Deichmann, 2021). Therefore, horizontal leadership is more in line with a culture of high uncertainty avoidance. According to Cultural Congruence Proposition (House et al., 1997), we propose that the relationship between horizontal leadership and knowledge sharing is stronger in high uncertainty avoidance (vs. low uncertainty avoidance) cultures.

H2b. Uncertainty avoidance moderates the relationships between horizontal leadership and knowledge sharing such that those relationships are stronger in high uncertainty avoidance cultures than in low uncertainty avoidance cultures.

(3) Long-term orientation or short-term orientation

Time orientation reflects whether a society prioritizes the long term over the short term (Hofstede, 2001). Individuals from national cultures that score high on long-term orientation tend to focus on the future, whereas people from national cultures with a low score on this dimension tend to focus on the present and past (Hofstede & Minkov, 2010). Specifically, long-term orientation describes people's tendency to carefully consider and weigh future outcomes when making decisions (Hofstede & Minkov, 2010). Short-term orientation attaches a high value of importance to the immediate results of their behaviors and diminishes future implications (Gui et al., 2021).

Firstly, horizontal leadership is dynamic, and that leadership role can be

undertaken by different team members simultaneously or at different stages (D'Innocenzo et al., 2016), which can help organizations break away from personal dependence and contribute to their long-term development. Secondly, horizontal leadership is a "simultaneous, continuous, and mutually influencing process" (Pearce, 2004) that includes continuous influence of team members at the same level, horizontally, upwards, or downwards, emphasizing the continuity of influence (Pearce & Conger, 2003). It is conducive to the long-term performance of members. These characteristics of horizontal leadership are consistent with the concept of long-term orientation. On the contrary, in a short-term-oriented culture, more emphasis is placed on short-term performance rather than long-term organizational development (Gui et al., 2021), which contradicts the values of horizontal leadership. Based on these reasons, we expect that long-term orientations positively moderates the relationship between horizontal leadership and knowledge sharing.

H2c: Long-term orientation and short-term orientation moderate the relationships between horizontal leadership and knowledge sharing such that those relationships are stronger in long-term orientation cultures than in short-term orientation cultures.

3. Method

3.1 Literature search

We conducted an extensive search to identify published and unpublished studies (both in English and Chinese). The primary search was completed on March 4, 2023. English databases utilized were EBSCO, Scoups, Proquest Dissertations and Theses, Web of Science, Wiley, Emerald, PsycINFO, Elsevier Science Direct, JSTOR, CambridgeCore, Taylor & Francis, Sage, and Google Scholar. In addition, Chinese databases utilized were China National Knowledge Infrastructure (CNKI), CNKI degree thesis database, CNKI conference database, Wanfang database (limited core journals), Wanfang degree thesis database, Wanfang conference database and Vip database (limited core journals).

We searched the titles and abstracts by using the terms *horizontal leadership, plural* leadership, shared leadership, collective leadership, distributed leadership, team leadership, peer leadership, and overall leadership* in combination with these terms: *knowledge shar*, information shar*, knowledge donat*, Knowledge contribution, Information contribution, knowledge exchange, knowledge hid* and knowledge hoard* in English, as well as translation of the above keywords in Chinese. We obtained 865 records from searching the databases. After removing 56 duplicated articles that due to searching in different databases, a total of 809 articles were advanced

to title and abstract screening.

3.2 Primary inclusion criteria and coding procedures

For inclusion, each primary study had to (a) present a quantitative study; (b) be written in English or Chinese; (c) conduct on the sample of employees; (d) report the correlation coefficient between shared leadership and knowledge sharing at the same level. Studies that did not meet these standards were excluded. Further, some studies only report regression coefficients. After contacting the primary authors to request the correlation table, we deleted studies in which the authors failed to provide the correlation table. The specific screening process is shown in Figure 1. Finally, this produced 23 potentially relevant articles, including 13 in English and 10 in Chinese. All articles were double-coded. Each article is independently coded by two researchers to avoid subjective judgment issues. The coding consistency is above 97.4%, and all disagreements were resolved collaboratively. Table 1 summarizes the basic overview of the included articles.

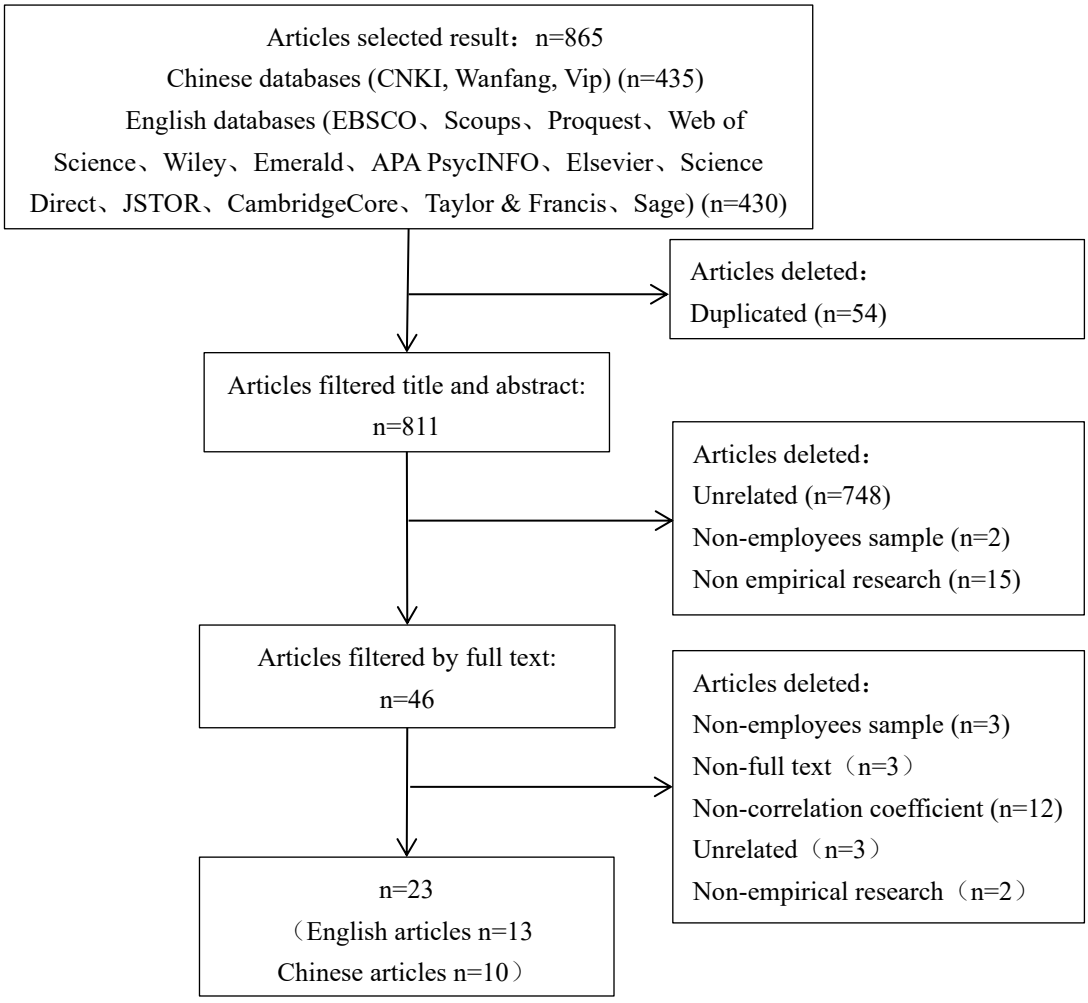

Figure 1 Article selection process

Table 1 Descriptive statistics of included articles

Leadership	Number of independent samples	Number of respondents	National culture		
			Masculinity	High uncertainty avoidance	Long-term orientation cultures
Distributed leadership	3	1165	16	6	18
Shared Leadership	20	5954	1	2	1
Total	23	7119	17	8	19

3.3 Meta-analysis procedures

First, we used the method of Hunter and Schmidt (2004) to integrate the effect size using a random effect model, and the random effect meta-analytic procedures were applied using the R metafor packages (Viechtbauer & Viechtbauer, 2015). The sample size and measurement errors were corrected. Second, we used Cronbach's alpha coefficient of internal consistency to correct correlations for artifact distributions of measurement error for perceptions of leadership and work engagement. In line with previous meta-analysis (Mackey et al., 2017), for studies that do not report Cronbach's alpha, we used a mean internal consistency value from other studies included in our meta-analysis. Third, we used the R dmetar package to conduct a moderating effects analysis to determine whether national culture, research level, and measurement of knowledge sharing affected the relationship between shared leadership and knowledge sharing. We used a minimum of three effect sizes per subgroup for categorical moderators and a minimum of six effect sizes for continuous moderators (e.g., Hoffman et al., 2007). For national culture, we identified the country in each study that had been conducted and then used each country's ranking on Hofstede and Minkov's (2010) national culture scale to code the sample was from which culture (i.e., masculinity or femininity, high-uncertainty avoidance or low-uncertainty avoidance, long-term orientation or short-term orientation). Countries were coded on a scale from 1 to 100 for each culture; a score of 1–49 was considered femininity, low-uncertainty avoidance, and short-term orientation, as well as those above 50 and above were considered masculinity, high-uncertainty avoidance, and long-term orientation (Hofstede & Minkov, 2010). Finally, an Egger test was conducted using the meta package to test the included literature for publication bias, and a sensitivity analysis was conducted to verify whether removing outliers would have a significant effect on the results. Specifically, we conducted specific-sample removed sensitivity analyses by removing studies with effect sizes that exceeded the 95% CI of the overall effect size (Harrer et al., 2022; Hunter & Schmidt, 2004).

4. Results

4.1 Hypotheses testing

Table 2 presents a summary of the meta-analytic results for the associations between leadership and knowledge sharing. The sample-size weighted average correlations were positive for knowledge sharing and shared leadership (k=20, ρ =0.489), distributed leadership (k=3, ρ =0.483). Thus, shared leadership and distributed leadership are both positively related to knowledge sharing, and hypothesis 1a and 1b was supported. Although knowledge sharing was more relevant to distributed leadership than shared leadership, the difference between them was not significant (Q=0.382, p=0.537), and research question 1 was answered.

Table 2 Meta-analysis results for leadership and knowledge sharing

Variable	*k*	*N*	*r*	*ρ*	*SEρ*	*Q*	lower	upper	I^2	Trim and fill	Subgroup *Q*	Sensitivity analyses and diagnostics				Eggers test	
												removed	*k*	*ρ*	I^2	*t*	*p*
Horizontal leadership	23	7119	0.440	0.497***	0.054	437.748***	0.352	0.521	94.965%	0.494	-	16	7	0.420	61.6%	-0.851	0.404
Distributed leadership	3	1165	0.448	0.483***	0.082	12.877**	0.351	0.597	84.670%	-	0.382	0	3	0.483	84.5%	-	-
Shared Leadership	20	5954	0.434	0.489***	0.060	506.532***	0.333	0.512	95.339%	0.421		9	11	0.458	82.7%	-0.851	0.404

Notes: *N*= total number of respondents; *k* = number of independent samples included; *r* =weighted mean correlation; *ρ* = sample-size-weighted mean observed correlation; *SE ρ* = standard error for population estimate; I^2 = an index of heterogeneity computed as the percentage of variability in effects sizes that are due to true differences among the studies; Q provides information on whether there is statistically significant heterogeneity (i.e., yes or no heterogeneity). ρ sensitivity analysis = specific-sample removed sensitivity analyses; lower represents the lower bound of 95% CI, and upper represents the upper bound of 95% CI; Subgroup *Q* represents the Q value of the subgroup test; In the "Sensitivity analyses and diagnostics": removed represents the number of independent studies removed for sensitivity analysis; *k* = the number of independent studies used for analysis; *ρ* = sample size weighted average observation.In the "Eggers test": *t* = denotes t-value for Egger test test; *p* = p-value for Egger test. $^{*}p<0.05$, $^{**}p<0.01$, $^{***}p<0.001$.

Due to the significant Q-statistic between shared leadership and knowledge sharing and the high I^2 (>75%), a subsequent moderating effect analysis was necessary. In addition, due to the small sample size of distributed leaders, we combined distributed leaders with shared leaders in the analysis of moderating effects. Next, we report the test of moderation effects of national culture and the results of other moderators.

(1) Moderation effects: National culture

Masculinity or femininity. We found masculinity positively moderates the horizontal leadership – knowledge sharing relationship (Q=14.341, $p<0.001$). As expected, the mean corrected correlation was lower in countries with masculinity(k=17, ρ=0.483) than in countries with femininity (k=5, ρ=0.579). Thus, Hypothesis 2a was supported.

Uncertainty avoidance. We found uncertainty avoidance positively moderates the horizontal leadership – knowledge sharing relationship (Q=14.203, $p<0.001$). As expected, the mean corrected correlation was higher in countries with high UA (k=8, ρ=0.600) than in countries with low UA (k=14, ρ=0.446). Thus, Hypothesis 2b was supported.

Long-term orientation or short-term orientation. We found long-term orientation positively moderates the horizontal leadership – knowledge sharing relationship (Q=9.398, $p < 0.01$). As expected, the mean corrected correlation was higher in countries with long-term orientation (k=19, ρ=0.512) than in countries with short-term orientation (k=3, ρ=0.471). Thus, Hypothesis 2c was supported.

Table 3 Meta-analysis results for leadership and knowledge sharing: the role of national culture

		K	*N*	*r*	*ρ*	*SEρ*	*Q*	lower	upper	I^2	Subgroup Q
Masculinity	High	17	4836	0.425	0.483***	0.64	293.172***	0.317	0.522	94.831%	11.341**
	Low	5	2003	0.527	0.579***	0.101	55.093***	0.370	0.655	94.692%	
Uncertainty avoidance	High	8	2830	0.545	0.600***	0.081	103.936***	0.424	0.647	94.337%	14.203***
	Low	14	4009	0.388	0.446***	0.067	218.238***	0.272	0.493	94.232%	
Long-term orientation	High	19	5775	0.453	0.512***	0.062	394.364***	0.352	0.545	95.403%	9.398**
	Low	3	1064	0.423	0.471***	0.107	22.618***	0.236	0.579	89.24%	

Notes: $^{+}p<0.1$, $^{*}p<0.05$, $^{**}p<0.01$, $^{***}p<0.001$.

4.2 Sensitivity analyses and publication bias

The sensitivity analyses revealed that after removing outliers (i.e., the study's confidence interval does not overlap with the confidence interval of the pooled effect, (Harrer et al., 2022)), results did not differ much from the overall meta-results (see Table 2). Specifically, we found positive correlations between knowledge sharing and shared leadership (with 9 studies removed, k=11, ρ=0.458, I^2=82.7%), and distributed leadership (with 0 studies removed, k=3, ρ=0.483, I^2=84.5%). To some extent, it shows the stability of the results of this paper.

A common issue that has been discussed in meta-analysis research is the publication bias problem, which assumes that a study with a low effect size is less likely to be published than a study with a high effect size (Harrer et al., 2022). To examine this kind of bias, we used the Eggers test and trim-and-fill approach. Publication bias analyses were not conducted for distributed leadership due to the small sample size. For shared leadership, the p-value of Eggers test was statistically not significant (k=20, t=-0.851, p=.404). Finally, we used Duval's (2005) trim and fill method. The adjusted effect size for shared leadership was the same as the overall pooled effect size (see Table 2).

4.3 Supplementary analysis

We have found that there is no difference in the relationship between shared and distributed leadership and knowledge sharing. Therefore, when studying the influencing factors of the relationship between shared (distributed) leadership and knowledge sharing, we analyze horizontal leadership as a whole. Meta-analysis results

for supplementary analysis are shown in Table 4.

(1) Research level

Leadership behavior has a more persistent influence on high-level level outcome variables (e.g., team knowledge sharing), while the influence on individual-level outcome variables (e.g., individual knowledge sharing) is less persistent (Fischer et al., 2017). But some scholars have found that the same leadership behavior is not only applicable to a specific level (Dong et al., 2017), specifically, for certain leadership behavior, it is not necessarily the correlation of the same variables at the team level higher than the individual level. For all these reasons, we examined the effect of research level on the relationship between horizontal leadership and knowledge sharing.

Table 4 reports the moderation analysis of the study level. Although horizontal leadership and knowledge sharing showed stronger mean corrected correlations for individual level (k=8, ρ=0.586) than for team level (k=15, ρ=0.445) studies, the difference was insignificant (Q=1.986, p=0.159). Specifically, there was not a research level difference in the relationship between horizontal leadership and knowledge sharing.

(2) Measurement of knowledge sharing

Many alternative scales exist for measuring knowledge sharing behavior, and in the sample literature, the scale developed by Bock et al. (2005) is the more commonly used measure of knowledge sharing (a total of 7 papers have used this scale). However, there are other measures available, and these measurements have different dimensions for knowledge sharing. Bock's scale focuses on knowledge sharing willingness (Bock et al., 2005), while Wang's scale measures knowledge sharing willingness and knowledge sharing ability. Because knowledge sharing involves multidimensional concepts and variables, the use of the scale may affect the results. Therefore, we examined the effect of the measure of knowledge sharing on the relationship between horizontal leadership and knowledge sharing.

Horizontal leadership showed stronger mean corrected correlations for studies using Bock's measurement of knowledge sharing (k=7, ρ =0.557) than other measurements (k=16, ρ =0.470), but the difference was insignificant (Q=0.699, p=0.403). In other words, the measure of knowledge sharing did not influence the relationship between horizontal leadership and knowledge sharing.

(3) Study design

Horizontal leadership has been defined as an emergent and dynamic leadership process in teams (Pearce, 2004). Thus, it is important to study how shared leadership

changes over time. Wu and Cormican (2016) recommended that "the optimal level of shared leadership appears in the early phase of a project, and when the team advances into later phases, the leadership changes and focuses on a few individuals". For all these reasons, we examined the effect of study design (cross-sectional vs multi-wave) on the relationship between horizontal leadership and knowledge sharing.

Table 4 reports the moderation analysis of the study design. Although horizontal leadership and knowledge sharing showed stronger mean corrected correlations for cross-sectional studies (k=21, ρ=0.502) than for longitudinal (k=4, ρ=0.385) studies, the difference was insignificant(Q=0.334, p=0.900). Thus, studies with longitudinal surveys do not exert an effect on the overall relationship between horizontal leadership and team outcomes.

(4) Sample characteristics

The relationship between leadership behavior and outcome variables can be influenced by various industry factors and sample characteristics, such as industry type and gender (Lyubykh et al., 2022; Mackey et al., 2017). Therefore, our research aimed to analyze the moderating effects of industry type and the male gender ratio. Among the coding literature included in the meta-analysis, the most frequently represented industries were the high-tech industry, manufacturing industry, and mixed industry. Consequently, we categorized the industries into these three categories for further analysis. The results indicated that the corrected correlations between horizontal leadership and knowledge sharing was stronger in the manufacturing industry (k=3, ρ =0.586) compared to the high-tech industry (k=8, ρ =0.450) and other industries (k=12, ρ =0.394). However, this difference was not statistically significant (Q=1.429, p=0.490). In other words, the relationship between horizontal leadership and knowledge sharing was not influenced by industry type. Furthermore, the moderating effect of the male gender ratio was found to have no significant impact on the relationship between horizontal leadership and knowledge sharing (b=0.115, p=0.767).

Table 4 Meta-analysis results for supplementary analysis

Categorical Moderator											
Moderator	Subgroup	*K*	*N*	*r*	*ρ*	*SEρ*	*Q*	lower	upper	I^2	Subgroup *Q*
Research level	Individual level	8	2941	0.521	0.586***	0.098	191.061***	0.368	0.647	96.303%	1.986
	Team Level	15	4178	0.393	0.445***	0.061	208.600***	0.289	0.489	93.334%	
Measurement of knowledge sharing	Bock	7	2256	0.500	0.557***	0.118	196.112***	0.308	0.652	96.732%	0.699
	Other	16	4863	0.413	0.470***	0.058	239.029***	0.315	0.503	93.650%	
Study design	Cross-sectional	21	6452	0.444	0.502***	0.052	329.412***	0.358	0.522	94.169%	0.334
	Longitudinal	2	1516	0.345	0.385+	0.197	154.581***	-0.026	0.633	98.256%	

Industry	Manufacturing industry	3	711	0.500	0.586**	0.221	73.726***	0.235	0.802	96.997%	1.429
	High-tech industry	8	2498	0.406	0.450***	0.090	174.241***	0.298	0.579	94.955%	
	Other industries	12	3910	0.363	0.394***	0.065	179.036***	0.282	0.496	93.677%	
Continuous Moderator											
Male gender ratio											
					b				*p*		
Knowledge Sharing					0.115				0.767		

Note:***$p<0.001$; *b* = regression coefficient; *p* = significance

5. Discussion

This study used meta-analysis to investigate the relationship between different types of horizontal leadership (shared leadership, distributed leadership) and knowledge sharing, as well as the potential impact of national culture on the relationships between them. The main research conclusions are as follows.

First, although there are differences in the focus of horizontal leadership with different concepts (shared leadership/ distributed leadership), they both had a positive impact on knowledge sharing. Furthermore, there is no significant difference in the association between shared leadership/distributed leadership and knowledge sharing. This finding supports Goksoy's (2016) view that all concepts of horizontal leadership are close to one another in meaning and can be used interchangeably. But it is different from the argument of Denis et al. (2012) that there are different focuses and applicable scenarios between shared leadership and distributed leadership. However, we should understand the above conclusion with caution. On the one hand, there are many commonalities between shared leadership and distributed leadership from the measurement perspective. For example, the parallel with the following features: leadership is distributed across the many, not the few; leadership is not solely on the skills of individual leaders (Zhu et al., 2018). On the other hand, the limited primary studies on the relationship between distributed leadership behavior and knowledge sharing reduces the statistical power of subgroup analysis.

Second, the moderating effect of national culture indicates that the relationship between horizontal leadership and knowledge sharing is stronger in cultures with femininity, high uncertainty avoidance, and a high long-term orientation, which is consistent with the theory of cultural consistency. Horizontal leadership emphasizes cooperation for decision-making (Denis et al., 2012), which is consistent with the emphasis on cooperative communication in femininity; Horizontal leadership focuses on collective work towards organizational goals (Goksoy, 2016) which is consistent

with the active support of individuals in high uncertainty avoidance countries for common goals (Moser & Deichmann, 2021); Horizontal leadership emphasizes the continuity of influence (Pearce & Conger, 2003), which can help organizations develop in the long run, which is consistent with long-term orientation emphasizing future impact.

5.1 Theoretical Implications

Firstly, this research provided a deeper understanding of the effectiveness of horizontal leadership. We clarified the strength of the relationship between horizontal leadership and knowledge sharing, demonstrating that they were moderately related. This finding provided valuable insights into the extent to which horizontal leadership influences knowledge sharing within organizations. Moreover, we examined the impact of shared leadership and distributed leadership on knowledge sharing and found no significant difference between their impact. This finding suggested the possibility of conceptual redundancy between these two leadership styles, addressing the scholarly concerns regarding conceptual redundancy in horizontal leadership (D'Innocenzo et al., 2016). While Denis et al. (2012) argued that shared leadership and distributed leadership represented different types of leadership, with shared leadership focusing on mutual influence within a group and distributed leadership emphasizing power and responsibility rotation across multiple managerial groups, our findings indicated that both styles were positive associated with knowledge sharing, albeit without a significant difference. This lack of distinction may be attributed to the specific selection of outcome variables in our study. To further explore the differences between shared leadership and distributed leadership, future research could employ relative weight analysis or select alternative criteria variables. These approaches may shed more light on the unique characteristics and effects of each horizontal leadership style. Such investigations would deepen our understanding of the nuanced dynamics of horizontal leadership and its impact on organizational and individual outcomes.

Secondly, we have extended the boundary conditions under which horizontal leadership relate to knowledge sharing. Fitzsimons et al. (2011) argue that the moderating influence of cultural values is important for horizontal leadership effectiveness. Building upon previous empirical analyses, we respond to the call for scholars to pay attention to the impact of national/regional factors on leadership behavior and knowledge sharing in the future (Jiang & Chen, 2021). In our study, we found that this relationship was stronger in cultures characterized by femininity, high uncertainty avoidance, and long-term orientation. These findings provided support for

The Cultural Congruence Proposition, which suggests that leadership behaviors aligned with the cultural values held by subordinates are more effective (House et al., 1997). Specifically, our research highlights that leadership behavior that complements the cultural values of employees can facilitate and promote knowledge sharing. These results contribute to a deeper understanding of the interplay between leadership styles and cultural values in predicting knowledge sharing. They underscore the importance of considering cultural factors when studying and implementing horizontal leadership approaches.

In addition, we explored the moderating effects of methodological factors (e.g., research level, measurement of knowledge sharing, and research design) on the relationship between horizontal leadership and knowledge sharing. But the moderating effects of these factors were not significant. These conclusions prompt scholars to analyze and compare different research findings, suggesting that scale selection and research design may not be the main reasons for divergent conclusions. Therefore, our research findings provided valuable insights into the contingency factors that influence the relationship between horizontal leadership and knowledge sharing (Oc, 2018).

5.2 Managerial Implications

Knowledge sharing among organizational members does not consume knowledge, but rather promotes the creation and generation of knowledge, thereby enhancing the competitiveness of the organization (Zhao et al., 2023). How to promote knowledge sharing among organizational members is of great significance for management practice. The findings of this study have the following implications for organizational knowledge management: On the one hand, we advocate for companies to share leadership among team members to implement horizontal leadership. Horizontal leadership emphasizes change and development (Lyndon et al., 2020), which is in line with the challenges posed by society, such as the increasing dominance of knowledge-based employees who demand growth and self-worth realization. This means that companies must value change-oriented horizontal leadership as an effective way to promote knowledge sharing and enhance organizational competitiveness.

On the other hand, enterprises should implement horizontal leadership based on cultural environment, especially for multinational enterprises. The practice has shown that implementing horizontal leadership may not necessarily have a positive impact when the cultural background of the enterprise does not match horizontal leadership (Lv et al., 2018). Therefore, enterprises must understand how their leadership can perform differently in different cultural environments, and take timely intervention

measures in the team-building process to continuously shape the role of horizontal leadership in enhancing knowledge sharing.

5.3 Limitations and Future Research

While our research contributes new knowledge to the relationship between horizontal leadership and knowledge sharing, this study is not without limitations. First, the sample we included in our study was mostly cross-sectional (91.3%), not allowing us to provide robust evidence of causal relationships between horizontal leadership and knowledge sharing (Mackey et al., 2017). Second, the restriction to studies published in Chinese and English languages may limit the generalizability of findings, especially when exploring the moderating effects of national culture. Future research can overcome this limitation by conducting multilingual meta-analyses or including studies from a broader range of languages. By incorporating studies conducted in different cultural contexts, researchers can gain a more comprehensive understanding of how horizontal leadership and knowledge sharing interact across diverse cultural settings. Third, while the overall relationship between horizontal leadership and knowledge sharing has been examined, the specific effects on different dimensions of knowledge sharing were not investigated in this study. Fourthly, our research is constrained by the limited effect size, hindering a comprehensive analysis of the moderating effects of power distance and individualism (versus collectivism).

An important direction for future research examining horizontal leadership and knowledge sharing is to assess issues of causality. To establish causal relationships, researchers can consider incorporating longitudinal data or adopting study designs that provide insights into the causal ordering of variables. For instance, longitudinal studies can track participants over an extended period, allowing researchers to examine how changes in horizontal leadership behaviors influence knowledge sharing over time. These studies can provide valuable information on the temporal sequence of events and help establish causality. Additionally, utilizing study designs such as cross-lag panel designs or instrumental variables can further strengthen the ability to infer causality. By employing these methods, future research can provide a more robust understanding of the causal dynamics between horizontal leadership and knowledge sharing. Furthermore, longitudinal studies can offer insights into the developmental trajectory of horizontal leadership, uncovering how it evolves and changes over time. By addressing causality and examining the temporal aspects of horizontal leadership and knowledge sharing, future research can enhance the validity

and reliability of the conclusions drawn from this study, advancing our understanding of the relationship between these variables in organizational contexts.

Next, with the enrichment and deepening of research on horizontal leadership, future research can further analyze the impact of horizontal leadership on different dimensions of knowledge sharing. One direction for further analysis is to examine how horizontal leadership affects explicit knowledge sharing and tacit knowledge sharing, which are two distinct dimensions of knowledge sharing (Lin et al., 2022). Explicit knowledge refers to knowledge that can be easily articulated, codified, and transmitted, while tacit knowledge is more personal, rooted in individuals' experiences, insights, and intuitions (Lin et al., 2022). By exploring the impact of horizontal leadership on both explicit and tacit knowledge sharing separately, researchers can gain a more nuanced understanding of how different aspects of knowledge sharing are influenced by horizontal leadership behaviors. This analysis could shed light on whether certain dimensions of knowledge sharing are more strongly associated with horizontal leadership than others. Additionally, examining explicit and tacit knowledge sharing separately can also provide insights into the potential challenges and facilitators for horizontal leadership in promoting each type of knowledge sharing. Therefore, as research on horizontal leadership progresses, it would be valuable to conduct studies that specifically analyze the effects of horizontal leadership on explicit knowledge sharing and tacit knowledge sharing, contributing to a more thorough understanding of the relationship between horizontal leadership and different dimensions of knowledge sharing.

Thirdly, after reviewing the literature on horizontal leadership and knowledge sharing, it was found that the research on the mechanisms of the two is not sufficient. Specifically, potential mediators to consider include motivation, communication patterns, or organizational culture. Exploring these mediation processes would contribute to a more comprehensive understanding of the mechanisms through which horizontal leadership influences knowledge sharing. Furthermore, future research could examine moderation effects, investigating whether certain contextual factors or individual characteristics (e.g., personal values, stress at work, emotional level) influence the relationship between horizontal leadership and knowledge sharing. This would provide insights into boundary conditions and help identify when and under what circumstances horizontal leadership has a stronger or weaker impact on knowledge sharing. By focusing on mediation and moderation processes, future research can uncover the underlying mechanisms and boundary conditions of the relationship

between horizontal leadership and knowledge sharing. This knowledge will not only enhance theoretical understanding but also provide practical implications for organizations seeking to foster effective knowledge sharing through horizontal leadership practices.

Finally, another potential avenue for future research includes a more in-depth exploration of the moderating effects of the remaining dimensions of national culture, specifically power distance and individualism. As outlined by Hofstede (2001), national culture encompasses five dimensions: power distance, uncertainty avoidance, individualism, masculinity, and long-term orientation. It is recommended that subgroup analyses encompass a minimum of 3 effect values per subgroup (Borenstein et al., 2009). In our research, the effect sizes associated with power distance and individualism (versus collectivism) did not meet the specified requirements. Consequently, our analysis concentrated exclusively on uncertainty avoidance, masculinity, and long-term orientation. However, it is important to acknowledge that power distance and individualism are crucial dimensions within national culture. Examining their moderating effects holds significant implications for managerial practices, allowing multinational enterprises to implement horizontal leadership strategies tailored to diverse cultural contexts. As research on horizontal leadership and knowledge sharing continues to evolve, it would be valuable for scholars to explore the moderating effects of power distance and individualism (versus collectivism).

Conclusion

In the context of the knowledge economy, the relationship between horizontal leadership and knowledge sharing has garnered significant attention from both researchers and practitioners. This study aimed to examine the correlation between different conceptualizations of horizontal leadership (i.e., shared/distributed leadership) and knowledge sharing, and to explore how this relationship is influenced by national culture. Our findings indicate a positive correlation between horizontal leadership and knowledge sharing, with no significant differences in the strength of the correlation between the two conceptualizations. Moreover, our investigation into the moderating effects of national culture revealed that culture plays a significant role in shaping the relationship between horizontal leadership and knowledge sharing. Specifically, we found that this relationship is stronger in cultures characterized by femininity, high uncertainty avoidance, and long-term orientation, thus providing support for the notion of cultural consistency. Since most of the included studies in this meta-analysis were cross-sectional or longitudinal, the methodology of horizontal leadership – knowledge

sharing research needs to be improved to strengthen the plausibility of causal claims regarding the effects of horizontal leadership; especially experimental designs should be conducted in the future.

Data availability

The author confirms that all data generated or analysed during this study are included in this published article. Furthermore, primary and secondary sources and data supporting the findings of this study were all publicly available at the time of submission.

Ethics declarations

Competing interests

The author declares no competing interests.

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