Diversity of Social Ties and Employee Innovation: The Importance of Informal Learning and Reciprocity

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ABSTRACT

This study examines the relationship between employees' social tie diversity (ties heterogeneity based on organizational functions), innovative work behavior, informal field-based learning, and reciprocity (bidirectional ties proportion). A sample of 182 workers from an Italian clothing manufacturing company was analyzed. The findings reveal that social tie diversity positively influences innovative work behavior, and their relationship is mediated by informal field-based learning. Additionally, reciprocity strengthens the indirect link between social tie diversity and innovative work behavior. This research contributes to the network and innovation literature by corroborating the role of social tie diversity in promoting innovative work behaviors, highlighting the importance of informal field-based learning, and emphasizing the impact of reciprocity. By doing so, this study offers insights into processes and conditions under which social tie diversity has the greatest impact on employee innovation, providing practical implications for fostering innovative work behaviors in organizations.

La diversidad de los lazos sociales y la innovación en el trabajo: la importancia del aprendizaje informal y de la reciprocidad

RESUMEN

El estudio analiza la relación entre la variedad de vínculos sociales de los empleados (heterogeneidad de los vínculos cimentada en las funciones en la empresa), el comportamiento innovador en el trabajo, el aprendizaje informal de campo y la reciprocidad (proporción de vínculos bidireccionales). Se utilizó una muestra de 182 trabajadores de una empresa textil italiana. Se observó que la diversidad de vínculos sociales influye positivamente en el comportamiento innovador en el trabajo y que esta relación está mediada por el aprendizaje informal de campo. Además la reciprocidad fortalece la relación indirecta entre la diversidad de vínculos sociales y el comportamiento innovador en el trabajo. El estudio es una contribución a las publicaciones sobre redes e innovación al corroborar el papel que juega la diversidad de vínculos sociales en el impulso al comportamiento innovador en el trabajo, destacando la importancia del aprendizaje informal de campo y la influencia de la reciprocidad. De este modo el estudio aporta ideas sobre los procesos y condiciones en las que la diversidad de vínculos sociales tiene mayor repercusión en la innovación de los empleados, con implicaciones prácticas para impulsar el comportamiento innovador en el trabajo en las empresas.

Innovation is crucial for organizational adaptation, survival, and ultimately success (De Jong & Den Hartog, 2007). Employees play a vital role in the innovation process, thanks to their unique perspective on internal practices, and can offer new and useful ideas deriving from work activities that are directly applicable to their specific environment. As a result, firms are increasingly relying on their employees' innovative work behavior (IWB), that is, the generation and realization of new and useful ideas, products, processes, or procedures (Janssen, 2004) as catalysts for their innovation processes (Ding & Yu, 2020).

While traditional studies on IWB focus on the individual level of analysis (e.g., Anderson et al., 2014), a growing line of research suggests to understand IWBs as phenomena that transcend fixed levels of (individual, group, or organization) analysis and originate within internal social interactions and micro-processes across different levels within the organization (Anderson et al., 2014; Mannucci & Perry-Smith, 2022). Envisioning innovation from this angle necessitates analyzing how people develop and use interpersonal relationships in order to improve their social and professional networks through IWB (e.g., Baer et al., 2015; Burt, 2021; Perry-Smith & Mannucci,

2017). In other words, an approach that views innovation as a socially determined process involves shifting attention from individual characteristics to the nature of social interactions that occur among workers in an organization (Perry-Smith & Shalley, 2003).

To shed light on the impact of social processes on IWB, previous studies have utilized social network theories (e.g., Baer et al., 2015), making significant contributions to our understanding of how social interactions and networks influence innovation (Koseoglu & Shalley, 2021). Additionally, extensive research and meta-analytic evidence demonstrated the relevance of ego-centered networks (the network workers build for themself) as an antecedent for individual innovation (Baer et al., 2015; Perry-Smith, 2006). More in detail, some promising results show that a diverse social network in terms of functional areas allows access to more diverse information which enables IWB (Gong et al., 2020). Expanding on this line of inquiry, the current study seeks to advance the literature by, first, expanding our understanding of the distinctive characteristics of social ties that are more successful in promoting IWB and, second, determining how those ties facilitate IWBs.

Regarding the first goal, this study focuses on two specific relational characteristics that have not been addressed so far in the literature. On the one hand, when studying diversity of information from a network perspective, detailed knowledge about the origin of ties is of utmost importance as it provides further insights into the nature of the actual social exchange (Bruggeman, 2016). Many studies have called for addressing this issue by conceptually separating the source of ties from their strength (Hirst et al., 2015). The current study concentrates on the role of diversity of social ties concerning the functional areas with the aim of bridging the gap in the relationship between information diversity and innovation by decreasing the conceptual distance with respect to access to non-redundant information. On the other hand, this study suggests the importance and benefits of tie reciprocity as a condition for increasing the effects of diversity of social ties. Reciprocal ties not only carry information, but also significant social support due to their emotional charge, which translates into a greater possibility of assimilating and using information derived from heterogeneous interactions (Myers, 2021). Employees who share a reciprocal tie strengthen the supportive and cooperative elements that surround their relationship, maximizing the chances that their differences will spark positive outcomes. This is because reciprocity reduces the perception of threat associated with diversity and increases the actual acquisition of resources from different social ties by improving perceptions of support and collaboration (Deng et al., 2018; Shah et al., 2022; Su et al., 2021).

Regarding the second goal, this study aims at shedding light on how diversity of social ties is associated with innovative-related constructs (e.g., Gong et al., 2020). Up to now, existing literature has examined primarily their direct relationship, partially overlooking possible mechanisms preceding innovative work behaviors, leaving a major gap in theory building and testing (Baer et al., 2015). To address this matter, the current research posits informal field-based learning (IFBL) as an active knowledge mobilization mechanism. According to social capital theory and research (e.g., Lin, 1999), two important concepts are related to resources: accessibility and mobilization. Accessibility refers to employees' access to resources of others through social ties and mobilization indicates the ability to make use of those accessible resources. Informal field-based learning can act as the process maximizing the mobilization of inputs derived from the network. Diverse social ties increase innovative behavior providing access to different perspectives and ways of doing things. However, mere access is not sufficient for the realization of new and useful ideas as it also needs mobilization, that is, engaging in the intentional acquisition and elaboration of information (Tannenbaum & Wolfson, 2022). Thus, this study proposes informal field-based learning as an agentic mechanism connecting the effects of diversity of social ties on innovative work behavior.

Overall, the present study makes three key additions to the literature on social networks and innovation. First, it establishes the association between social diversity and innovative work behavior, though, often conceptualized, this relationship has been only rarely empirically tested and needs additional empirical corroboration (e.g., Gong et al., 2020). Second, the presented results offer insights into a specific learning mechanism, informal field-based learning, linking diversity of social ties and innovative work behavior. By doing so it extends the promising and growing body of literature that applies informal learning derived from network resources to the innovation/creativity literature (e.g., Myers, 2021). Third, the work elucidates the moderating role of reciprocity in the indirect relationship between diversity of social ties and employees' innovative work behavior via informal field-based learning. This broadens the understanding of reciprocity by responding to recent recommendations to investigate the conditions for maximizing the benefits of diversity on creativity and innovation-related dimensions (Ganguly et al., 2019). Additionally, it suggests that the synergetic nature of a worker's ties, in addition to the preceding metrics used based on position (centrality, betweenness, etc.), is a crucial component for learning and IWB, offering substantial implications for the literature on the social side of innovation.

Theory and Hypotheses

Diversity of Social Ties and Innovative Work Behavior

Innovative work behavior represents the generation and realization of new ideas within a role, group, or organization (Janssen, 2004). These types of behaviors are transversally relevant across all organizational functions (Bos-Nehles & Veenendaal, 2019). Although the specific nature of the output may vary based on the context, the underlying drives remain constant. For example, in R&D, innovative work behaviors typically lead to the development of new and better products (e.g., Gupta et al., 2017), while in the production area, to process improvements and optimization of resources (Bos-Nehles & Veenendaal, 2019). However, in all cases, innovation stems from employees' willingness to experiment or embrace new ideas (Battistelli et al., 2022).

The importance of network factors in supporting innovative work behaviors has been confirmed by numerous previous studies (e.g., Baer et al., 2015; Di Vincenzo & Iacopino, 2022), suggesting that innovation is not only a question of having individual skills but also of accessing and attaining critical resources from the social context (Soda et al., 2021). Common to all studies in this perspective is the idea that diversity-rich networks bring information benefits that enhance innovation by providing different and new perspectives, ideas, or expertise (Burt, 2001, 2021).

Employee innovative work behaviors often result from different combinations and reconfigurations of existing work-related knowledge (Cangialosi et al., 2021). One way to increase the attainment of novel and relevant information for facilitating the success of innovative efforts in the workplace is to cultivate social ties with others, which are "the channels through which ideas, influence, or information socially distant from ego may reach him" (Granovetter 1973, p. 1371). People usually acquire knowledge through interactions improving their understanding of a domain and opening a window into different points of view and consequently facilitating the generation and realization of feasible and unique approaches (Cross et al., 2001; Zhou et al., 2009). Novel information is thought to be valued according to its local scarcity, a reason why researchers have suggested that collecting diverse and nonredundant information and perspectives is beneficial to innovative work behavior (e.g., Baer, 2010; Zhou et al., 2009).

The assumption behind this argument is that a person may have more opportunities to acquire salient information for generating ideas depending on whom is connected, (Zhou et al., 2009), as

social ties are a key source of diverse ideas and viewpoints (Burt, 2021). Consequently, employees need to be connected to a network of dissimilar social ties, so that they can gain access to divergent knowledge, skills, and perspectives, to integrate a wider variety of information that ignites a successful generation of innovative ideas (e.g., Nedkovski & Guerci, 2021). Moreover, diversity of social ties increases familiarity with others who can validate innovative ideas and lend their necessary support in their realization (Wang et al., 2022). Thus, having access to individuals who are fundamentally different makes employees more likely to be exposed to a variety of perspectives and critical resources not only to generate but also to implement their ideas.

Diversity of social ties refers to the level of heterogeneity of a given feature with respect to the alters of an ego (Gong et al., 2020). Although work in this area is still scarce, researchers have indicated that diversity of social ties generally enhances innovation, because different ties can provide non-redundant and diverse information and perspectives (Gong et al., 2020; Rodan & Galunic, 2004). The diversity characteristics can take various forms, such as both task-oriented (e.g., educational background, role, organizational tenure) and relations-oriented (e.g., culture, gender, age; Anteby et al., 2016). Organizational function diversity, specifically, seems to foster a greater favorable work network where employees can derive unique resources for their innovative endeavors (Gong et al., 2020). Employees' organizational functions represent their specific field of work in the organization (production, sales, marketing, etc.) and often reflect their background, skills, and expertise. Thus, functional diversity of social ties refers to the extent to which alters have different work specificities (Gong et al., 2020; Jen, 2014).

From a different standpoint, team scholars studied functional diversity by focusing on the degree of heterogeneity of functions within a team (Cheung et al., 2016). This approach has produced a body of evidence consistently pointing to a positive impact of functional diversity on innovation-related outcomes (e.g., Abiew et al., 2021). These studies highlight that the presence of individuals with diverse functional or professional backgrounds within a team leads to innovative results as long as team members are capable of sharing and integrating diverse perspectives (van Knippenberg & Schippers, 2007). However, recent studies have started to delve into relational aspects of diversity that extend also beyond the boundaries of teams (Carbonell & Rodriguez Escudero, 2023). By considering diversity in the social network context, these studies aim to gain a more comprehensive understanding of how diverse individuals connect, collaborate, and leverage their expertise outside of team structures (Gong et al., 2020).

For this reason, the functional diversity of one's network can facilitate innovation similarly to the effects of diversity within a team, providing non-overlapping resources derived from a functionally diverse ego network that offers employees new and different perspectives (Baer et al., 2015). Some empirical evidence supports this argument. Rodan and Galunic (2004) found that network heterogeneity has a greater impact on individuals' innovative performance than on their overall managerial performance, suggesting its critical role in individual innovation. Furthermore, Gong et al. (2020) established that employees with a diverse network have higher levels of creative self-efficacy, which improves their creative performance.

Consequently, based on the aforementioned theoretical reflections and empirical results, this study focuses on the diversity of social ties in terms of functional areas as sources for gaining a broad range of work expertise and fueling the innovation process, postulating that diversity of social ties will be positively associated with innovative work behavior.

Hypothesis 1. The diversity of an employee's social ties is positively related to innovative work behavior.

The Mediating Role of Informal Field-Based Learning

Although several previous studies have indicated that the mechanism by which social network parameters influence innovation is connected to a process of acquiring relevant knowledge (Borgatti & Cross, 2003; Jen, 2014), the role of learning has so far been alluded to but never explicitly explored. Learning is a process of gaining knowledge through experience that shapes one's behavior (Savelsbergh et al., 2009). Informal learning is the prevailing form of learning in the workplace and it is capable of conveying information directly and effectively across the organization (Holman et al., 2012).

Informal learning has been conceptualized in various ways (e.g., Tannenbaum & Wolfson, 2022); a broad definition is that of learning initiated in the workplace that results in professional development or enhanced knowledge and skills occurring through active and vicarious learning methods (e.g., Cerasoli, et al., 2018; Tannenbaum & Wolfson, 2021). Recently, the informal field-based learning framework (Wolfson et al., 2018) has formalized the behaviors that constitute informal learning as a higher-order construct with three subdimensions including experimentation/new experiences (e.g., seeking new assignments, doing a task differently), feedback/reflection (e.g., actively seeking feedback and advice, debriefing work experiences), and vicarious learning behaviors (e.g., intentionally observing others).

Informal learning behaviors "do not occur in isolation and therefore must be understood as part of a larger context or organizational and individual characteristics that can encourage or impede the informal learning process" (Tannenbaum et al. 2010, p. 304). The composition of one's network, in terms of functional diversity, may create the drive for engaging in informal field-based learning (Post et al., 2009). Hence, social ties can play a pivotal role in enhancing informal learning behaviors as they carry opportunities for self-regulated, autonomous, and engaging learning while offering the most current, authentic, and diverse knowledge and skills (Gibson & Vermeulen, 2003). Functional diversity can facilitate the information elaboration process, as stated by workplace diversity literature (Gibson & Vermeulen, 2003; van Knippenberg & Schippers, 2007). Interaction with dissimilar others promotes learning by challenging individuals with new paradigms and perspectives and often requiring informal learning behaviors. Prior meta-analyses revealed that functional diversity at team level provides more opportunities for information exchange and elaboration which are core processes of informal learning (Cerasoli et al., 2018). Additionally, studies found that functional diversity, including different sources of information, knowledge, and expertise, helps team members engage each other in information elaboration (Wang, 2015). Hence, it is expected that employees will have more opportunities to find different types of information for informal learning when interacting with co-workers from different functional areas.

Moreover, the literature has long recognized the importance of informal learning in contributing to the development of various positive individual and organizational outcomes (Tannenbaum & Wolfson, 2022) including innovative-related constructs (Cangialosi et al., 2020). Informal learning is a key driver for innovative behaviors (Messmann & Mulder, 2012); employees need to acquire and process new knowledge to generate and implement new ideas (Janssen, 2004). Informal learning provides a basis for employees' innovations by increasing their knowledge in the work domain (Amabile, 1996). Several studies back this argument; for example, Zhang et al. (2021) found a positive relationship between employees' informal field-based learning and innovative performance. In addition, Cangialosi et al. (2022) showed that learning through experimentation, a subdimension of informal field-based learning, is significantly associated with idea generation, and Noefer et al. (2009) found that feedback seeking fosters innovative working behavior. Finally, Gerken et al. (2016) found a significant positive relationship between

feedback and information seeking and all dimensions of innovative work behavior. In conclusion, the present study posits that diversity of social ties enables a broader range of knowledge and experiences to be applied in informal learning, thereby improving employees' innovative work behaviors.

Hypothesis 2. The relationship between the diversity of an employee's social ties and innovative work behavior is mediated by informal field-based learning.

The Moderating Effect of Reciprocity

Although a heterogeneous ties composition offers a platform to access information and resources, it is important to note that more diversity in the functional background does not automatically translate into more informal learning and innovative work behaviors. Benefitting from the informational richness in diverse relations requires active interaction, as different views and knowledge of diverse employees must be constructively shared and dynamically integrated with the specific work context (van Knippenberg & Schippers, 2007). Therefore, reciprocity of social ties appears to play a key role, granting employees to maximize the potential benefits of diversity by increasing the quality and quantity of exchanges (Parker et al., 2023), thus allowing for deeper integration of all information and different perspectives (van Ginkel & van Knippenberg, 2008).

Whereas the diversity of one's ties is a feature of a network relationship, another key aspect is whether the relationship is reciprocal. Specifically, reciprocity can be defined as the proportion of bidirectional relations out of the total ties of an employee (Myers, 2021). Reciprocity focuses on the nature of ties between any given pair of employees and reflects a distinct focus on the tendency to develop mutual, rather than just one-way, connections (Newman, 2010). A reciprocal relationship can be considered as one in which each employee shares the experiences and knowledge of the other in a mutual give-and-take (Ipe, 2003). Research has noted reciprocity can help refine and shape emerging insights from shared knowledge, suggesting that it is key to realizing the learning benefits of a workplace relationship (Adler & Kwon, 2002).

The categorization-elaboration model (CEM) framework (van Knippenberg & Schippers, 2007) proposes that the effects of diversity on learning and innovation occur through two separate routes. In the elaboration process, diversity improves performance as it brings different information, skills, and perspectives, facilitating employees' resolution of the task (Ellis et al. 2013). On the contrary, in the categorization process, heterogeneity leads to the development of subgroups that can block effective exchanges and communications between employees (Antino et al., 2019). This study proposes that reciprocity can stimulate the elaboration process. In fact, reciprocal ties offer the possibility of richer and deeper discussions that can maximize the intake of different information and standpoints. At the same time, reciprocity can keep the forces of categorization at bay, as reciprocal exchanges are also necessarily emotionally charged, preventing the possibility of perceiving social distance or divisions into sub-groups.

Accordingly, building on this nascent recognition of reciprocity's role in workplace learning (e.g., Myers, 2021) and on the categorization-elaboration model (CEM) framework (van Knippenberg & Schippers, 2007), this study hypothesizes that the consequences of the diversity of social ties on informal-field based learning and, in turn, innovative work behavior, will be more positive when the employee's relationships would be more reciprocal. Figure 1 describes the hypothesized model.

Hypothesis 3. The reciprocity of an employee's social ties moderates the relationship of diversity of social ties on innovative work behavior such that the indirect effect through informal field-based learning is stronger at higher levels of reciprocity.

Figure 1. Theoretical Model.

Method

Procedure and Participants

This study was conducted as part of a joint project between the university and a clothing manufacturing company based in central Italy to foster employees' innovative behaviors throughout all hierarchical levels and functional areas. In order to continuously develop cutting-edge designs and identify ever-changing market trends, the company heavily relies on the cross-functional cooperation of its varied workforce, comprised of designers, fabric technicians, pattern makers, administrative, sales, and marketing professionals. Thanks to its commitment to collaboration among different areas and organizational flexibility to ensure the timely delivery of novel products, this organization provides an ideal context for exploring the relationships proposed in the research model. The project received approval from the university's ethics committee prior to data collection and informed consent was obtained from all participants. To generate each employee's personal network for subsequent analysis, a name generator technique was employed. This social network procedure requires the generation of lists of names of individuals comprising an individual's network, which are then associated with the respondent's name. To maintain confidentiality during this process, the original names have been replaced with randomly generated anonymous identification codes before conducting the actual analysis and in the stored data.

Data were collected through an online questionnaire addressed to the entire population of the organization that was asked to complete the survey (N = 239) over a period of 10 days; 183 questionnaires were returned, 1 was discarded as incomplete, and 182 were retained as complete responses (response rate = 76.1%). On average, the respondents' age was 37 (SD = 13) and their organizational tenure was 11 (SD = 11). The gender composition of the population was 147 males (80.8%) and 35 females (19.2%). The sample consisted of 156 employees (85%) deployed in production, 6 (4%) in business (sales and marketing), 3 (2%) in engineering and technology (R&D and quality assurance), 7 (4%) in general management (accounting, HR, and administration), and 10 (5%) in logistics (distribution and warehousing).

Measures

Diversity of Social Ties

Following common social network analysis data collection practices for organizational settings (Agneessens & Labianca, 2022), a name generator question was employed to define the network. Specifically, participants were asked to create an inventory of all the people they contacted for work-related advice, by responding to the following question: "List the names of all employees you went to for job-related advice over the last 9 months" (Erdogan et al., 2020). Subsequently, based on information from the HR department, participants were matched with their functional areas. In accordance with the previous literature (e.g., Bunderson & Sutcliffe, 2003; Gong et al., 2020), five functional organizational categories were adopted: 1

= production, 2 = business (sales and marketing), 3 = engineering and technology (R&D and quality assurance), 4 = general management (accounting, HR, and office administration), and 5 = logistics (distribution and warehousing). Subsequently, the Gini-Simpson index (also known as the Blau index) was then employed to estimate the functional diversity of employees' social ties based on the five categories:

$$1 - \Sigma P_i^2,$$

where P_i represents the proportion of social ties in the ith functional category.

Informal Field-based Learning

Informal field-based learning was measured using the 9-item scale (α = .86) developed by Wolfson et al. (2018), previously adapted and employed in Italian (e.g., Cangialosi et al., 2022). Items included the following: (1) actively seeking feedback from others; (2) seeking and receiving coaching or advice from job experts; (3) debriefing or discussing on-the-job experiences; (4) intentionally observing someone do his or her job; (5) asking questions of an expert; (6) having someone show you how to do something; (7) performing a task in a new and different way; (8) actively seeking and experiencing new assignments, situations, or tasks; and (9) "trial and error" to uncover a new or better solution. Each item was measured on a 5-point scale ranging from 1 = *never* to 5 = *always*.

Innovative Work Behavior

Innovative work behavior was measured following the procedure established in recent innovation studies based on social network analysis (e.g., Cangialosi et al., 2021). First, employees were asked to indicate who they had interacted with regularly in the last 9 months and, subsequently, the innovative work behavior of those colleagues was evaluated through the question "Innovative employees can effectively generate and implement novel ideas in the workplace. Please rate how innovative you believe each of your co-workers is", from *not at all* (1) to *extremely* (5) (Grosser et al., 2017).

Reciprocity

Reciprocity represents the proportion of directed ties for which one exists in the opposite route (Garlaschelli & Loffredo 2004), i.e., in which the relation outgoing from *i* to *j* is also reflected from *j* to *i*. Accordingly, the ratio of reciprocal links to the total number of existing links was measured for each employee (Girvan & Newman, 2002).

$$r = \frac{L^{<->}}{L},$$

where L represents the number of one's ties and $L^{<->}$ the number of reciprocated ties. A higher value indicates that the participant has more two-way interactions, while a low reciprocity value suggests that more interactions are one-sided.

Control Variables

Previous studies have indicated that age, gender, and organizational tenure can affect innovative work behavior (e.g., Odoardi et al., 2022). Therefore, those variables were included as controls. Furthermore, as a greater number of social ties offer a larger pool of information and knowledge that the employee can leverage in terms of learning and innovation (e.g., Gong et al., 2020), the present study also checked the number of social ties of an employee to exclude the possibility that the results were due to a spurious association.

Results

Preliminary Analysis

The means, standard deviations, bivariate correlations, and Cronbach's alpha of the presented variables are shown in Table 1. Diversity of social ties was positively related to informal field-based learning (r = .21, p < .01) and innovative work behavior (r = .18, p < .01). Informal field-based learning was positively related to innovative work behavior (r = .25, p < .01).

Innovative work behavior was assessed as the mean rating of each employee's network of colleagues; on average, each employee was rated by 4.73 co-workers (*SD* = 4.68). As this measure is the result of the assessment of raters the possibility of non-independence due to common raters needs to be ruled out (Bliese, 2000). Hence, inter-rater reliability (ICC1, ICC2) and inter-rater agreement (r_{wg}) scores were measured to show the degree of consistency and consensus among multiple judges rating each employee's innovative work behavior. The results showed adequate reliability and agreement levels (ICC1 = .44, ICC2 = .79, mean r_{wg} = .71, median = .75), implying that it was appropriate to average various innovation ratings into a single innovation score for each employee (Bliese, 2000).

Hypothesis Testing

To test the study hypotheses, ordinary least squares regression models were carried out with SPSS program (Table 2). Hayes' (2017) PROCESS macro with the bootstrapping technique was adopted for assessing the mediation and moderation effects. Hypothesis 1 stated that diversity of social ties was positively related to innovative work behavior. The results display that this relationship is positive and significant (b = 1.95, p < .01; Model 2), thus supporting Hypothesis 1.

Table 1. Means, Standard Deviations, and Correlations

	M	*SD*	1	2	3	4	5	6	7
1. IWB	3.58	0.92							
2. IFBL	3.26	0.78	.25**	(.86)					
3. Diversity of social ties	0.08	0.13	.34**	.19**					
4. Reciprocity	0.35	0.27	.04	.13	.08				
5. Number of social ties	10.73	6.47	.28**	.15	.46**	.30**			
6. Gender	0.19	0.39	-.01	-.14	.09	.05	-.11		
7. Age	37.34	13.65	.05	-.26**	.28**	-.04	.12	.27**	
8. Organizational tenure	11.28	11.08	-.01	-.23**	.27**	.03	.10	.32**	.73**

Note. N = 182; gender was coded 1 = female and 0 = male; IWB = innovative work behavior, IFBL = informal field-based learning.
*p < .05, **p < .01.

Table 2. Regression of Diversity of Social Ties, Informal Field-based Learning, and Reciprocity Predicting Innovative Work Behavior

	IWB			IFBL		
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Intercept	2.97**	3.19**	2.35**	3.71**	3.62**	3.91**
Control variables						
Number of social ties	.04**	.02	.02	.01	.01	-.01
Gender	.08	.04	.06	.11	-.12	-.15
Age	.07	.05	.01	-.01	-.02*	-.01
Organizational tenure	-.01	-.01	-.01	-.08	-.09	-.01
Independent variable						
Diversity of social ties		1.95**	1.61*	1.53**	1.63**	-.28
Mediator variable						
IFBL			.27*			
Moderator						
Reciprocity					.27	-.08
Interaction						
Diversity of social ties x Reciprocity						6.51**
R^2	.087**	.145**	.174**	.161**	.168**	.241**
ΔR^2		.58	.29		.007	.73

Note. N = 182; based on 10,000 bootstrap resamples; IWB = innovative work behavior, IFBL = informal field-based learning.
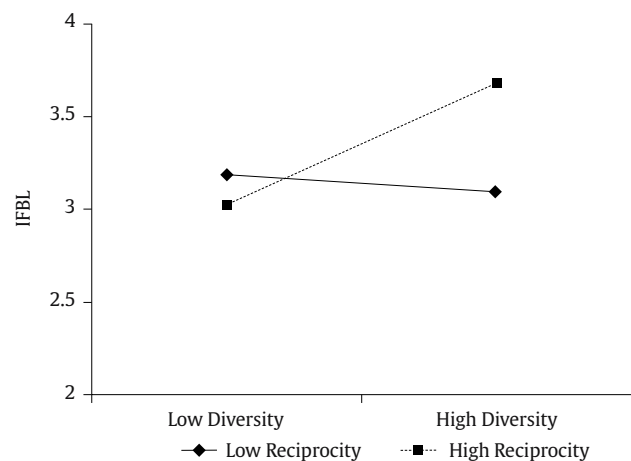*p < .05, **p < .01.

Hypothesis 2 posited that informal field-based learning mediated the relationship between diversity of social ties and innovative work behavior. The results show that diversity of social ties has a significant link to informal field-based learning (b = 1.53, p < .01; Model 4), which in turn associates with innovative work behavior (b = .27, p < .05; Model 3). In addition, the indirect effect of diversity of social ties on innovative work behavior through informal field-based learning was tested with bootstrapping methodology (Preacher et al., 2007). The bias-corrected bootstrap results based on 10,000 resamples indicate a significant indirect effect (.34, 95% CI [.046, .786]), supporting Hypothesis 2.

Hypothesis 3 stated that reciprocity moderated the association of diversity of social ties and innovative work behavior through informal field-based learning. The results show that the interaction term has a significant effect on informal field-based learning (b = 6.51, p < .01; Model 6) when both the independent and the moderator variables are present (Cohen et al., 2003). Simple slopes that are one standard deviation below and above the mean are used to display the interaction in Figure 2. Using a bootstrapped model based on 10,000 resamples of conditional indirect effects, a moderated mediation was tested (Preacher et al., 2007). Table 3 shows a significant variation in the indirect effect of diversity of social ties on innovative work behavior through informal field-based learning depending on the levels of reciprocity. Specifically, a statistically significant effect is observed at high levels of reciprocity (.62, 95% CI [.142, 1.55], +1 *SD*), while, at low levels, the effect fails to reach statistical significance (.08, 95% CI [-.275, .338], -1 *SD*). Finally, the statistical significance of the moderated mediation effect was assessed with the index of moderated mediation (Hayes, 2015). The coefficient (1.41) and bias-corrected bootstrap confidence intervals based on 10,000 resamples imply a significant effect (95% CI [.231, 2.99]). Thus, these results imply the presence of an overall moderated mediation effect, supporting Hypothesis 3.

Figure 2. Simple Slopes for the Effects of Diversity of Social Ties on Informal Field-based Learning at Low and High Levels of Reciprocity.

Discussion

Theoretical Implication

The goal of this study was to determine when and how social diversity promotes innovative work behavior. The results have disclosed that diversity of social ties has a positive relationship with employee innovative work behavior; that informal field-based learning mediates this association; and that reciprocity amplifies the indirect relationship, such that individuals with a greater ratio of reciprocal ties hold an increase in the effects of diversity of social ties on informal field-based learning and, in turn, on innovative work behavior. As such, this study offers some important literature insight into the effects of social ties on employee innovation in addition to that of past research.

First, this study showed the direct association between diversity of social ties and innovative work behavior. This finding supports the recent trend to focus on the diversity of social ties rather than on the distinction between weak and strong social ties (Baer et

Table 3. Indirect Effect of Diversity of Social Ties on Innovative Work Behavior

	Level	Effect	*SE*	*LL*CI	*UL*CI
DST → IFBL → IWB	-1 *SD*	.08	.15	-.275	0.338
	+1 *SD*	.62	.26	.142	1.550

Note. N = 182; based on 10,000 bootstrap resamples; DST = diversity of social ties.

al., 2015). More specifically, drawing on the concept of knowledge recombination (e.g., Xiao et al., 2022), this study asserts the role of the diversity of social ties in facilitating the acquisition of ideas and perspectives from dissimilar domains. When individuals from different organizational areas relate, their diversity generates opportunities for cross-pollination of knowledge, favoring the emergence of innovative ideas. This study joins the emergent body of research that seeks to clarify the role of tie diversity in influencing organizational behaviors (Gong et al., 2020). The link between diverse social ties and innovation-related constructs has been proposed in the past (e.g., Gong et al., 2020; Wang et al., 2022), though studies on this matter have been quite rare, thus providing only limited support to confirm this relationship (Baer et al., 2015). Consequently, this study provides further evidence that employees with diverse network ties are facilitated in successfully carrying out innovative behaviors.

Second, the present research empirically tested the role of informal field-based learning in mediating the relationship between diversity of social ties and innovative work behavior, showing that diversity of social ties increases employee innovative work behaviors via informal field-based learning. When employees have social ties with individuals pertaining to diverse organizational domains, they are driven to higher levels of informal learning which translate into innovative work behaviors. In other words, by engaging in informal field-based learning, employees can leverage the diversity of their social ties to expand their repertoire of workplace knowledge, perspectives, and experiences to generate novel ideas. This indicates that although social ties provide a platform to access resources, it is individual learning behaviors that enhance the optimal collection and utilization of that information into novel and useful ideas. In that, informal field-based learning can be seen as a cognitive elaboration process, whereby individuals actively seek out and process information from their social ties in diverse organizational domains. This aligns with the CEM's emphasis (van Knippenberg & Schippers, 2007) on the importance of elaboration processes in translating social stimuli into innovative outcomes. Moreover, this result substantiates the social ties perspective on innovation by directly measuring and testing the information argument (Phelps et al., 2012). Although the assumption that social ties influence access to knowledge to which individuals have access underpins a significant amount of research linking social networks to innovation (e.g., Brass, 2022; Phelps et al., 2012), the role of volitive learning behaviors to accrue and elaborate that information has not been considered. Hence, the present study provides evidence for this argument by showing informal field-based learning as a mechanism for acquiring and processing information for innovative endeavors.

Another important addition of this study to the literature is the analysis of reciprocity as a moderator of the impact of diversity of social ties on informal field-based learning and, in turn, innovative work behavior. The results indicated that diversity of social ties has a stronger effect on informal field-based learning when employees' ties are also reciprocal. By emphasizing the role of reciprocity, this study highlights the synergistic effects that arise when diverse social ties are accompanied by reciprocal relationships. Based on the CEM framework (van Knippenberg & Schippers, 2007) this study provides the basis for the idea that reciprocal exchanges can increase the possibility of processing information and perspectives from a functional diverse social environment. Reciprocal exchanges foster feelings of trust and mutual benefit, creating an environment conducive to cognitive elaboration. This finding highlights the dynamic nature of workplace social interactions and the significance of reciprocal relationships in amplifying the effects of social diversity on innovative behaviors. Consequently, reciprocity constitutes an ideal for untangling the effects of diversity of social ties on informal learning and innovation, aiding a finer comprehension of how they can act as catalytic ingredients. This moves beyond a static

understanding of diversity and highlights the dynamic nature of workplace social interactions (Göbel et al., 2013). Therefore, given the lack of prior studies on the subject, these findings significantly increase the understanding of the role of reciprocity for informal learning and innovation and respond to recent requests for analyzing conditions for boosting the positive effects of diversity (Ganguly et al., 2019; Gong et al., 2020; Myers, 2021).

Practical Implications

This study also presents several important practical implications for organizations wanting to enhance their employees' innovation. First, managers and HR practitioners should encourage and help the interaction of employees from diverse functional areas, as dissimilar social ties promote individual innovation and informal learning because of the resources available for idea generation and realization. One strategy for enhancing cross-functional interactions in the organization is providing a digital platform for exchanging work-related information. This would grant employees to get in touch with each other beyond their normal work routine enabling the expansion of their network to other functional areas. Moreover, managers should develop organizational socialization practices aimed at cross-functional employee onboarding, which will allow the new hires to build diverse ties from the beginning of their career path and possibly maintain these relationships for the rest of their working life. Managers can also further facilitate cross-functional ties by directly offering collaboration opportunities between members of different areas (e.g., boundary spanning activities) or by explicitly mentioning in team meetings areas of core expertise present in other parts of the organization, thus aiding employees' awareness of opportunities for more diverse interactions (Majchrzak et al., 2007).

Second, because informal field-based learning mediated the effect of diversity of social ties and innovative work behaviors, organizations should encourage informal learning behaviors to obtain more employees' innovation. Hence, organizations should promote informal learning in the workplace as this can act as a mechanism linking diversity of social ties to the generation and realization of novel and useful ideas. This can be done by building a climate in which learning is supported and opportunities for improving everybody's experience and skills are proactively sought. Furthermore, managers aiming at boosting informal learning levels among their employees can include learning values as a foundation for HRM performance appraisals or set learning goals that focus on knowledge and skill development as part of employees' evaluation scales (Seijts & Latham, 2012).

Finally, to best capitalize on the diversity of their relationships, employees must also build reciprocal ties. Accordingly, managers should favor reciprocal social ties between employees from different organizational functions, as the presence of high levels of both types of relationship leads to higher levels of informal learning in the field and, consequently, innovation. HR practices of job rotation, where possible, can be helpful to this end, as moving periodically to different functional parts of the organization provides employees with the opportunity to strengthen their relationships by working closely with colleagues from diverse areas. Moreover, social gatherings or activities held outside of work can boost the quality of interactions between employees from different functional areas.

Limitations

Despite the previously discussed theoretical and practical implications, the present study is not without limitations. First, causality between variables cannot be inferred as the data for this study were collected at one point in time. The model tested in this study should be examined in future research through

longitudinal design that allows for appropriate analysis of causal relationships.

Secondly, since innovative behavior at work is a construct composed of idea generation and realization sub-dimensions, these could have differential effects that were not taken into account by the measurement used in the present study. Despite the widespread use of one-dimensional constructs to measure innovative behaviors in both traditional and more recent research (e.g., Odoardi et al., 2019), to enable a more in-depth analysis of how the posited antecedents differently impact each element, future studies should assess these dimensions individually.

Additionally, the measure adopted for assessing IWB was a single item. This can lead participants to give a fuzzy interpretation without considering all aspects of the construct; however, recent studies show that constructs that are well conceptually defined can be assessed with single-item measures with good levels of reliability and validity (Mathews et al., 2022).

Third, this study associates the diversity of social ties with their provenance in typical functional areas. Because modern organizational activities are often cross-functional, interactions among areas are necessary and expected to convey relevant functional information to employees. However, it is possible, in some cases, that knowledge from different areas substantially overlaps, thus not providing the non-redundant inputs needed to innovate, or, in other cases, that information is too diverse to be relevant for the unit of adoption. Future research should directly address these possible alternatives.

Furthermore, the sample was comprised mostly of male workers and consequently functional diversity was not aligned with gender. Although out of our initial scope, future research could address the joint impact of functional and gender diversity, as suggested by the relations demography literature (Chattopadhyay et al., 2004). According to this literature, the joint impact of gender and functional diversity could offer a more complete view on the effects of reciprocity (e.g., gender-functionality alignment may reduce the effectiveness of reciprocity compared to situations where they are discordant). Additionally, Future studies should strive to include a more equal representation of genders to gain a comprehensive understanding of the phenomenon under consideration. Similarly, because numerosity was skewed toward the production area, future research should include balanced proportions of individuals from diverse functional areas within the company.

Finally, the study focused on a single industry based in central Italy, hence, cultural differences may appear in cross-cultural replications of the present study. Additionally, the company was middle-sized and future research should expand the sample size to increase the generalizability of the results.

Conclusion

The present study provided insights into the relationship between social diversity, innovative work behavior, informal field-based learning, and reciprocity. The findings indicate that diversity of social ties positively influences employees' innovative work behavior, highlighting the need to consider the diversity of ties rather than just their strength. The study also reveals that informal field-based learning serves as a mediator between social diversity and innovative work behavior, emphasizing the role of individual learning behaviors in utilizing knowledge for generating and realizing new ideas. Additionally, the study shows that reciprocity acts as a moderator, strengthening the connection between social diversity and informal field-based learning, suggesting that reciprocity enhances the likelihood of effective knowledge exchange and information processing within a diverse social surrounding. These findings have significance for firms that want to stimulate innovation by fostering social interactions across functional areas, supporting informal field-based learning, and cultivating reciprocal ties among employees.

Conflict of Interest

The authors of this article declare no conflict of interest.

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