

## Article

# What Makes Firms Innovative? The Role of Social Capital in Corporate Innovation

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**Abstract:** This paper offers a social capital explanation for the purported relationship between human capital investment and an organization's innovation capability. We argue that social capital plays a mediating role in the relationship between the level of individual knowledge of employees and organizations' innovation capabilities. The mediating mechanism is attributed to the role of social capital in knowledge exchange and combination that help enhance knowledge creation. Using survey data of 319 manufacturing firms in Korea, we conducted structural equation modeling (SEM) analysis to verify the mediating role of social capital in firms' innovation performance. The results demonstrated that relational and cognitive dimensions of social capital are important mediators in realizing organizational innovation performance.

**Keywords:** innovation capability; social capital; knowledge creation; human capital investment

## 1. Introduction

What makes organizations innovative? The antecedents of organizational innovation are one of the most widely studied research topics among management scholars, as innovation is considered a core element for corporate growth and crucial for companies attaining sustainable competitive advantage [1–5]. Innovation capability is understood as being closely tied to a firm's ability to utilize its knowledge resources [1,2,6,7], and scholars have emphasized the role of individual manpower in the increase of innovation capability, in that the knowledge and skills brought into the firm by scientists and engineers can help firms innovate [7,8]. In this regard, it has been popular for firms to bring in innovative geniuses who possess the required technical skills and expertise to enhance their innovative capabilities.

However, nowadays many firms renowned for their excellence in innovation, such as Google, Facebook, and Amazon, among others, have begun to pay more attention to networks, instead of turning to a few innovative geniuses to enhance their innovation performance. Such knowledge networks are increasingly seen as central means to foster and enhance organizations' learning and knowledge sharing, and thus companies attempt to have channels where people can congregate. Google Cafés, which are designed to encourage interactions between employees within and across teams, and to spark conversation about work as well as play [9], are a good example. In line with this argument, previous research suggests that organizational innovation performance depends on an organizational culture or work practices that can foster innovation [10–14].

Various studies provide evidence that an individual's human capital contributes to the organization's innovative capability [15–20]. The concept of human capital refers to individuals' knowledge, skills and abilities embodied in people that compel them to act in new ways [21,22]. These knowledge, skills, and abilities represent capital because they enhance productivity [23]. Human capital theory posits that individuals with more or higher quality human capital will produce more

desirable outcomes [20]. However, the question of how investment in human capital, such as training which intends to increase employees' level of knowledge, skills, abilities and values, contributes to the process of enacting innovation has eluded most scholars except for a few studies [24,25]. This research endeavors to fill that void. While it is intuitive that the knowledge and competence of employees contribute to the organization's innovative capability, it is less clear how having such efforts to enhance individual human capital might transform into organization-level effort toward innovation, thereby generating differences in innovative performance across firms.

This study thus starts from the premise that companies can enhance knowledge creation through social capital, which leads to superior innovation performance. Social capital is defined as "the sum of the actual and potential resources embedded within, available through, and derived from the network of relationships possessed by an individual or social unit" [26]. The central proposition in the social capital literature is that networks of relationships constitute resources that can be used for the good of the collective [27,28]. Accordingly, the social capital theory argues that the relationship resources existing among individuals or organizational units can be a source of knowledge creation and innovation at the organizational level [27–29]. Thus, in this paper we develop arguments that speak to the role of social capital as a catalyst for innovation and arguments as to how the different dimensions of social capital affect innovation.

In doing so, this study makes many contributions. First, this study investigates the underlying process of how investments in human capital lead to superior innovation performance through details that were noted as limitations in prior research [30,31]. Considering that maximizing the impact of human capital in organizations is one of the core inquiries in strategic human resource management [32,33] and that the underlying mechanisms that account for the effects of investments designed to build human capital on innovative performance are remaining as the "black box" [30,31,34], this study is expected to contribute greatly to the related research. Second, this study verifies a comprehensive mediating model with the three dimensions of social capital and provided empirical support for the theoretical proposition that social capital is a cornerstone of innovative capabilities [2,35], through a large-scale statistical examination, which to our knowledge is one of initial attempts. By synthesizing insights from studies on social capital, this study develops a research framework that conceptually delineates and can empirically test how different aspects of social capital and their interrelationships selectively influence organizational innovative capabilities that are critical in the development of sustainable competitive advantage.

The remainder of this article is organized as follows. The following section draws research hypotheses based on a literature review of existing studies regarding human capital, social capital and corporate innovation. The research setting and measurements of both the research data and variables are then presented. Finally, the study's research findings and implications are discussed.

## 2. Theory and Hypotheses

### 2.1. Knowledge Management, Human Capital, Social Capital and Innovation

The management of knowledge is frequently identified as an important antecedent to innovation. The concept of human capital and knowledge management is that people possess skills, experience and knowledge, and therefore contribute to organizational innovative performance [16,18,19,31,36].

Organizational innovation refers to the introduction of any new product, process, or system into an organization [37]. Many scholars posit that the exchange and combination of knowledge lead to the development of new products and services [1,36,38,39]. In other words, innovation is the outcome of exchanging and combining knowledge through interaction among various actors [40,41]. Naturally, it is important for companies to establish a climate of social exchange as it aids new knowledge creation to achieve innovation performance [42–44]. In this regard, researchers recently have noted the role of social climates or relationships that facilitate the development of employee capabilities to combine and exchange information to create new knowledge [13,40,45–47].

The social capital concept originated from community studies, and was extended to the organizational social capital field in the late 1990s to study social relations between organizations and the individuals within them [27,48,49]. Characterized by durable, interconnected relationships between humans, social capital is tightly bound with the strategy of the firm [27]. As such, the development of social capital within an organization is likely to be a source of sustainable competitive advantage [27,50–52]. According to [27], social interaction is an important feature of social capital and it strongly influences the extent to which interpersonal knowledge sharing occurs. Some studies indicated that improved mutual relationships among employees has a positive effect on attitudes toward knowledge sharing [53,54]. In this regard, there is a growing interest in the role of social capital in relation to the knowledge creation and transfer processes within organizational contexts [55–57]. Thus, this study identifies, from a perspective of knowledge creation, how social capital affects innovation performance through the process of exchanging and combining knowledge.

## 2.2. Investment in Human Capital and Social Capital

Investment in human capital refers to processes that relate to training, education, and other professional initiatives, to increase employees' levels of knowledge, skills, abilities, and values [58,59]. A growing body of studies recently attempted to understand the mechanisms through which the skill and expertise of employees related to training and education become the predictors that improve overall corporate innovative performance [25,60,61]. Employee training and education are especially important in that they can influence and modify employees' attitudes and capabilities [40,60,62]. The training literature suggests that when employees perceive a high degree of support to develop their skills and abilities, they feel more obligated to their organization and tend to increase reciprocal attitudes, help coworkers, and engage in more organizational relationships [63–65].

Social capital is centrally concerned with the significance of relationships as a resource for social action [21,49,66,67]. In integrating the existing studies, Nahapiet and Ghoshal [27] defined social capital as having three dimensions: structural, relational, and cognitive. First, the structural dimension is an overall pattern of connections between agents; it signifies who is reached and how they are reached. Representative structural dimensions include network ties, the network configuration, and appropriable organizations. Second, the relational dimension is formed from relationships, and acts as a lever. Representative relational dimensions are trust and trustworthiness, norms and sanctions, obligations and expectations, and identification. Third, the cognitive dimension provides shared representation, interpretations, and systems of meaning. Shared codes and languages as well as shared narratives fall under this category. Based on this classification and related previous studies, we set a community of practice, which represents the overall social interactions found in organizations [54,68], as the structural dimension variable. We also set trust as the relational dimension variable, and shared codes and languages as the cognitive dimension variable [24,48]. We comprehensively investigate in the following how investment in employee training and education influences the formation of structural, relational, and cognitive social capital, i.e., communities of practice, trust, and shared codes and language, which are expected to enhance corporate innovation performance.

*Communities of Practice (CoPs).* A CoP is defined as a group of people informally bound by their shared expertise and passion for a joint enterprise [69]. As participation in CoPs is generally based on voluntary contributions, members' motivation to participate in a CoP becomes a central determinant of the CoP's interactions [70,71]. According to [30], such human resource practices as training and education develop employees' motivation to participate in activities that enhance firm performance. Thus, we may conjecture that employees may become more willing to discuss problems in groups, and participate in such group activities as CoPs, if they are exposed to more training opportunities. We propose the following based on this line of reasoning:

**Hypothesis 1a.** *Investment in human capital will enhance an organization's structural social capital in the form of CoPs.*

*Trust.* Trust is an implicit set of beliefs that the other party will refrain from opportunistic behavior and will not take advantage of the situation [72,73]. Employees are more likely to trust one another if they have interacted [74]. Therefore, providing training and development opportunities for employees may foster increased trust among employees by providing chances for greater communication and interaction. Additionally, specific and close interpersonal contact and knowledge regarding the other party affect the formation of trust [75–77]. Thus, we posit the following:

**Hypothesis 1b.** *Investment in human capital will enhance an organization's relational social capital in the form of trust.*

*Shared Codes and Languages.* Employees acknowledge that the organization cares for them if the organization helps them to develop their personal and professional goals. With this support, an organization's members may become more loyal to the organization [64,78] and this interaction among the organization's members, through education and training, can trigger the sharing of vision and codes [79,80]. The members concur through social interaction, which, in turn, compels them to share their values, attitudes, and goals [81,82]. Therefore, we suggest the following hypothesis:

**Hypothesis 1c.** *Investment in human capital will enhance an organization's cognitive social capital in the form of shared codes and language.*

### 2.3. Social Capital and Innovation

According to [27], new knowledge is created within organizations through the process of exchange and combination among employees. This argument implies that the exchange and combination create new knowledge by connecting previously unconnected ideas and knowledge or recombining previously connected ideas and knowledge in novel ways [40,83,84]. According to previous research, characteristics of a corporate social environment facilitate such an exchange and combination [27,44,83], which is considered to be the outcome of utilization and creation of knowledge [85,86]. We explore below how structural, relational, and cognitive social capital facilitate corporate innovation activities by triggering knowledge exchange and combination.

*Communities of Practice (CoPs).* Establishing a knowledge management-friendly atmosphere, including the active promotion of CoPs, will increase peoples' awareness of the necessity to share knowledge in an organization [72,87]. CoPs by nature help people jointly develop new knowledge of an organization, and can thus be beneficial in starting new lines of business, quickly solving problems, transferring best practices, and developing professional skills [69,88]. We propose the following based on this line of reasoning:

**Hypothesis 2a.** *A CoP will enhance the organization's innovation performance through its effects on knowledge exchange and combination.*

*Trust.* A social climate of trust is widely observed as essential for increasing interaction and the likelihood of information exchange between individuals [27,89]. High levels of trust also increase employees' tendencies to seek and offer help, increasing the chances for exchange [90,91]. Therefore, trust should promote the exchange of valuable ideas between knowledge workers that will, in turn, lead to greater innovation. Therefore, we suggest the following hypothesis:

**Hypothesis 2b.** *Trust will enhance an organization's innovation performance through its effects on knowledge exchange and combination.*

*Shared Codes and Language.* While trust may increase the likelihood that exchange will occur, shared codes and language facilitate both access to information and the integration of exchanged

knowledge [40]. A degree of shared knowledge or understanding is essential for individuals to comprehend and integrate new knowledge, which is acquired from exchanges with other employees [65,84,92]. A climate for shared codes and language provides a common base of understanding through which individuals with disparate experience, knowledge, and backgrounds can transfer and integrate new ideas [93,94]. Greater cognitive distance requires more effort to understand and absorb what others do, and to communicate [95]. Therefore, we propose the following.

**Hypothesis 2c.** *Shared codes and language will enhance an organization's innovation performance through its effects on knowledge exchange and combination.*

#### 2.4. The Mediating Role of Social Capital

This study presumed that an indirect relationship exists between investment in human capital and its innovation performance; for example, a company's investment in human capital may not guarantee its innovation performance. Specifically, not all companies can improve their innovation performance simply by increasing their budget for employee training and education, or by hiring innovative geniuses. Rather, they can improve innovation performance only when their human capital investment affects the formation of employees' structural, relational, and cognitive social capital. The role of mediation of social capital can be seen from hypothesis 1 and 2. Namely, the following relationship will be established.

**Hypothesis 3.** *An organization's social capital will mediate the influence of its investment in human capital on its innovation performance.*

### 3. Method

#### 3.1. Research Setting and Analysis

To verify our model, we used Human Capital Corporate Panel (HCCP) data provided by the Korea Research Institute for Vocational Education and Training (KRIVET). The HCCP data is based on a human resource management and development activities survey, which has been performed biannually since 2005, in partnership with the Ministry of Employment and Labor of Korea. We used the latest survey data on 319 manufacturing firms from 2013 (5th) to test our hypotheses. The sample for the survey is randomly drawn from the KIS corporate data of all private business organizations with 100 or more employees and with more than 300 million won of capital net worth in Korea. Also, the survey data are collected from multiple informants (i.e., HRM directors, employees, strategy directors, and department managers), thus helping avoid problems associated with common method bias. Most variables in the questionnaires are measured using a 5-point scale, ranging from 1 (strongly disagree) to 5 (strongly agree).

#### 3.2. Focal Variables

**Investment in human capital.** To measure investment in human capital, which is the independent variable of this study, we used annual costs spent in group-based training and education. The survey asked each company to identify costs for the three types of employee training and education separately—i.e., costs for individual-based training and education (e-learning and online book-learning), costs for group-based training and education (internal and external), and financial support for external education. Among those, we utilized costs for group-based training and education, which are expected to have maximal effects on the formation of social capital at the organizational level. The usage of actual investment data in this study leads us to overcome the limitation of most previous studies, which used subjective measurements for human capital investment [96,97]. We calculated this variable



by dividing the total amount of group-based training and education expenses by the number of total employees to obtain per capita spending on employee training [25].

**Social Capital.** To measure social capital, our mediating variable, we utilized the following survey data. Firstly, we assessed structural social capital—the level of CoP activities involvement of employees—with a questionnaire item, “In our company, employees are actively engaged in mutual learning among,” adapted from [98]. Secondly, we measured relational social capital—the strength of trust among employees—with a questionnaire item, “In our company, employees have trusting relationships,” following [99]. Lastly, we assessed cognitive social capital—the degree of shared code and language—with the following questionnaire item, “Our company shares company norms and information into details to the employees through management or the information system,” based on study [27]. These three items were measured with a 5-point scale of (1) absolutely not; (2) preferably not; (3) neutral; (4) possibly; (5) definitely. As questionnaire items were limited and generally facet-based, we used a single measure approach instead of using multiple-item measures.

**Innovation Performance.** To measure innovation performance, we considered multiple dimensions of innovative performance such as new product development, product and service differentiation and new customer recruitment suggested by previous studies [100,101]. We used ratings for the following three questions: (1) “Our company had competitive advantage over other companies in new product development”; (2) “Our company had competitive advantage over other companies in introducing differentiation in the products and/or services”; and (3) “Our company had higher ratio of new customers compared to the industry average”. The measurement was based on a 5-point scale (1 = much lower than the industry average, and 5 = much higher than the industry average) and was rated by employees. We aggregated individual responses to analyze the organization level of innovation performance.

### 3.3. Control Variables

To control for industry-level and firm-specific effects, which may influence corporate innovation performance, we included various control variables.

First, the nature of the industries that organizations compete in is known to influence their innovative capabilities [2,102,103]. Therefore, we controlled the effects of environmental change. The degree of environmental change was measured with a questionnaire item, “To what extent did the industry your company competes in experience demand changes in the last two years?” and a questionnaire item, “To what extent did the industry your company competes in experience new product development or introduction in the last two years?” The measurement was based on a 4-point scale (1 = not at all, and 4 = a great deal) and was rated by strategy directors. We aggregated ratings of the two questionnaire items.

Second, this study also controlled the overall level of human capital in a firm. Many previous studies posit that the overall skill, expertise, and knowledge levels of an organization’s employees are crucial for organizational innovation performance [2,23,104,105]. We used survey ratings on the level of overall skills and expertise of employees in five functional areas- R&D, sales and service, engineering, management, and production. The measurement was based on a 5-point scale (1 = much lower than the industry average, and 5 = much higher than the industry average) and rated by employees at all levels. We used the average rating of the five questionnaire items.

Third, we controlled the effects of prior performance, considering that firms may increase innovation performance when they have greater slack resources [2,106,107]. The survey reported ratings on prior performance by strategy directors with a questionnaire item, “Our company lacked resource capacity due to economic downturn or management crisis.” The measurement was based on a 5-point scale (1 = not at all, and 5 = a great deal) and was rated by strategy directors.

Finally, we controlled the size of an organization that may play a key role in innovative capability. Previous research assumes that the extensive resources of large organizations may be more likely to

develop innovative capabilities [2,108]. We divided the size of firms based on the number of employees into below 300, 300–1000, and above 1000 and set dummy variables for each.

#### 4. Results

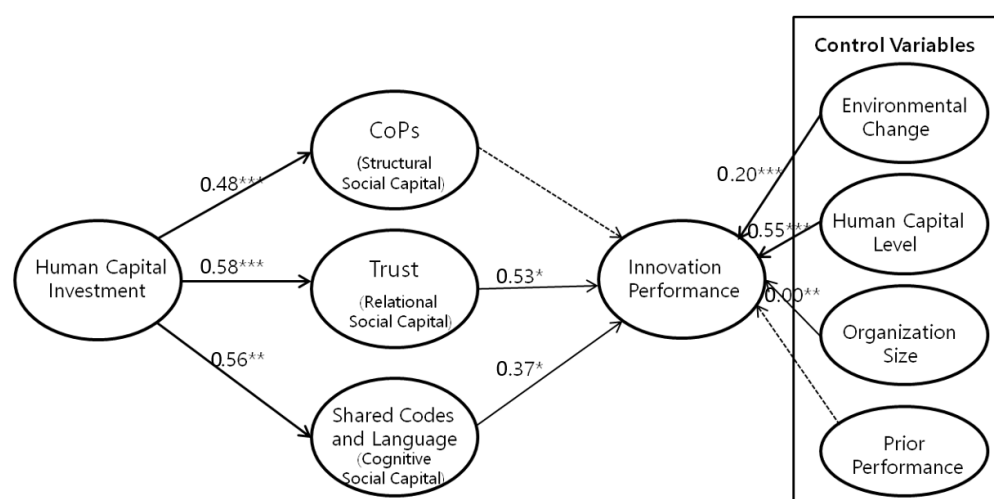
Table 1 reports the means, standard deviations, and correlations of all variables. Generally, the results showed significant correlations between dependent and independent variables. The variance inflation factors (VIFs) are well below the cut-off point of 10, suggesting little multicollinearity in our data.

**Table 1.** Means, Standard Deviations, and Correlations.

	Mean	SD	1	2	3	4	5	6	7	8	9
1. Innovation Performance	10.24	1.36	1								
2. Human Capital Investment	0.11	0.15	0.19 **	1							
3. Structural Social Capital	2.63	0.38	0.23 **	0.19 **	1						
4. Relational Social Capital	3.53	0.35	0.34 **	0.25 **	0.48 **	1					
5. Cognitive Social Capital	3.27	0.47	0.30 **	0.18 **	0.41 **	0.66 **	1				
6. Environment Change	5.45	1.49	0.34 **	0.09	0.18 **	0.09 **	0.09	1			
7. Human Capital Level	2.99	0.48	0.32 **	0.10	0.17 **	0.22 **	0.15 **	0.10	1		
8. Prior Performance	2.50	1.07	−0.25 **	−0.10	−0.12 *	−0.14 *	−0.09	−0.34 **	−0.17 **	1	
9. Firm Size	750.9	1982.5	0.23 **	0.11	0.20 **	0.18 **	0.06	0.11	0.13 *	−0.08	1

\* Correlation is significant at the 0.05 level (2-tailed); \*\* Correlation is significant at the 0.01 level (2-tailed).

We used structural equation modeling (SEM) to examine the relationships among investment in human capital, the mediating effects of social capital, and innovation performance. Figure 1 displays the full mediation model with standardized path coefficients. Results show that the model had a good fit to the data ( $\chi^2 = 37.465$ ,  $df = 13$ ,  $p < 0.001$ ,  $RMSEA = 0.077$ ,  $CFI = 0.946$ ,  $NFI = 0.925$ ,  $TLI = 0.815$ ), supporting the hypothesized relationships of human capital investment with structural social capital ( $\beta = 0.48$ ,  $p < 0.01$ ), relational social capital ( $\beta = 0.58$ ,  $p < 0.01$ ) and cognitive social capital ( $\beta = 0.56$ ,  $p < 0.01$ ); relational social capital with innovation performance ( $\beta = 0.53$ ,  $p < 0.05$ ); and cognitive social capital with innovation performance ( $\beta = 0.37$ ,  $p < 0.05$ ). Therefore, hypotheses 1a, 1b, 1c, 2b and 2c were supported. However, the effect of structural social capital on innovative performance was non-significant, disconfirming Hypothesis 2a. Hence, hypothesis 3 was supported except for the variable of structural social capital.



**Figure 1.** Structural Equation Model (Full Mediation). Note: Nonsignificant paths are depicted as dotted lines in the diagram. +  $p < 0.10$ ; \*  $p < 0.05$ ; \*\*  $p < 0.01$ .

To further examine whether social capital fully or partially mediated the relationship between human capital investment and innovation performance, we tested an alternative model that included

a direct path from the independent variable to the outcome variable. This partial mediation model also provided a good fit to the data ( $\chi^2 = 35.521$ ,  $df = 12$ ,  $p < 0.001$ ,  $RMSEA = 0.079$ ,  $CFI = 0.949$ ,  $NFI = 0.929$ ,  $TLI = 0.807$ ), however, the fully mediated structural model demonstrated a better fit to the data than the partially mediated model (see Table 2).

**Table 2.** Fit indices for baseline, fully mediated, and partially mediated models.

	CMIN	df	CMIN/df	RMSEA	CFI	NFI	TLI	$\Delta\chi^2$
Partially mediated model	35.521	12	2.960/12	0.079	0.949	0.929	0.807	
Fully mediated model	37.465	13	2.882/13	0.077	0.946	0.925	0.815	1.94

In addition, as shown in Figure 1, several of our control variables exhibited significant effects on the innovation performance variable. Environmental change ( $\beta = 0.20$ ,  $p < 0.01$ ), human capital level ( $\beta = 0.55$ ,  $p < 0.01$ ), and firm size ( $\beta = 0.01$ ,  $p < 0.01$ ) were significantly related to innovation performance.

## 5. Discussion

The objective of this research was to verify the role of social capital in organization's innovation in relation to knowledge management. For this, we elaborated on how the different dimensions of social capital affect innovation and tested a detailed model of investment in human capital's effects on corporate innovation performance. The results demonstrated that social capital is an important mediator in realizing organizational innovation performance. Specifically, social capital played an essential role in connecting investment in human capital with an organization's innovative performance through its effects on knowledge exchange and combination.

The implications of this study can be summarized as follows. Theoretically, this study is meaningful in that it displayed and verified the mediating role of social capital in knowledge creation in all three dimensions—structural, relational, and cognitive—with large-scale statistical examination. The findings contribute to the social capital literature by enriching and providing strong empirical support for the theoretical proposition that social capital is a cornerstone of innovative capabilities [2,35]. Also, the findings provide support for the argument that social capital serves as a catalyst for organizational innovation by triggering knowledge exchange and combination among employees [27,50,51]. Also, this study verified the positive effect of group-based investment in human capital on organizational innovation performance. Considering that the theoretical framework for the relationship between investment in human capital and organizational innovation performance has been subject to considerable debate [25,109], this study is expected to make contributions to the strategic human resource management literature, laying a foundation on the efficacy of different types of investment in human capital on corporate innovation. In noting such findings, scholars may further elaborate upon the efficacy of group-based human capital investment in future studies. Lastly, the results indicate that to effectively leverage investments in human capital firms should invest in the organizational design that will enhance social capital among employees. That is, company managers may benefit from establishing a climate of social exchange that will encourage employees to build trust and share their expertise, to enhance organizational innovation performance that will be crucial to achieve the sustained competitive advantages.

Naturally, our study is subject to some limitations. The first concerns the cultural context of our data. As pointed out by some scholars previously, cultural differences may influence the formation of social capital [110,111]. Therefore, further study that utilizes cross-cultural data may be necessary to generalize the findings of this study. Secondly, the use of the archived data can be a disadvantage in that some data do not fully cover the domains of the constructs we attempted to measure. We used single-item measures instead of multiple-item scales to measure social capital. While some scholars argue for the practical virtues of single-item measures [112,113], future research may try multiple-item measures to better operationalize each dimension of social capital and to enhance reliability. In addition, we did not examine whether other organizational factors limited the positive impact of social capital on



corporate innovation. Future research may look at potential moderators of the relationships between social capital and organizational innovation capability to determine what types of firms are most likely to benefit from organizational level arrangement for social exchange. Thirdly, it would be interesting to examine the effects of social capital on different types of corporate innovation capabilities [2,24] to verify the efficacy of each dimension of social capital on corporate innovation. Finally, we limit our study to cross-sectional designs. The implications may be further strengthened by the use of longitudinal data, as the impact of investment in human capital is not immediate but embedded and realized through time [114,115]. We hope that future research will challenge and verify these issues further.

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