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Contingent effects of workforce diversity on firm innovation: high-tech industry and market turbulence as critical environmental contingencies

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ABSTRACT

This study investigates the effects of firm-level workforce diversity on firm innovation. Instead of focusing on the main effects of diversity, we adopt contingency theory and propose that the demographic and status diversity of an entire organizational workforce promote or impede firm innovation depending on firm environmental contingencies. Analysis of multisource, multiwave data collected from 178 Korean companies indicates that gender and status diversity contribute to firm innovation in highly turbulent markets. However, having the same status diversity is detrimental to the innovation of firms under low market turbulence. Age diversity in high-tech firms with a relatively young workforce increases firm innovation. This conceptual and empirical analysis offers novel practical and theoretical insights into the role of demographic and status diversity toward firm innovation by identifying critical environmental contingencies that shape the implications of workforce diversity on firm innovation.

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Contingency theory; firm innovation; high-tech industry; market turbulence; workforce diversity

Introduction

Globalization, fierce market competition, and rapid technological changes exert enormous pressure on contemporary firms to innovate (Greenhalgh, Glenn, Bate, Macfarlane, & Kyriakidou, 2007). Thus, 'in today's economy, firms are challenged to continuously offer a portfolio of innovative products and services' (Talke, Salomo, & Rost, 2010, p. 907). Scholars have identified variance and heterogeneity among organizational constituents as critical sources of firm innovation and environmental adaptation (cf. population ecology, Hannan & Freeman, 1984; Van de Ven & Poole, 1995). Despite the widely acknowledged value of

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diversity in overcoming adaptive challenges and the substantial body of empirical literature on this matter (Bantel & Jackson, 1989; Talke et al., 2010), meta-analytic reviews have suggested that the effects of diversity on work unit performance are not yet fully understood, and empirical findings are mixed (Bell, Villado, Lukasik, Belau, & Briggs, 2011; Horwitz & Horwitz, 2007; Hülsheger, Anderson, & Salgado, 2009).

Drawing insights from contingency theory (Donaldson, 2001), diversity researchers have examined contingency factors that can activate the negative or positive side of diversity (Richard, Murthi, & Ismail, 2007; Van Knippenberg, De Dreu, & Homan, 2004; Wegge, Roth, Neubach, Schmidt, & Kanfer, 2008). These researchers highlighted the role of *context*, which 'can set specific constraints and opportunities that either enhance or minimize the direct effects of work team diversity on performance' (Joshi & Roh, 2009, p. 601). Kunze, Boehm, and Bruch (2013) demonstrated that at the firm level, the negative effect of firm-level age diversity on firm performance can be attenuated by firm characteristics, such as strong diversity-friendly HR policies and weak top management age stereotyping (cf. diversity climate, McKay & Avery, 2015). Richard et al. (2007) reported a U-shaped relationship between racial diversity and firm performance. However, such a relationship observed in the sample of Fortune's 'Best Companies for Minorities' could not be generalized in the sample of Fortune's 'Best Companies to Work For', in which racial diversity exerted a linear negative effect on short-term performance (Julian & Ofori-Dankwa, 2017). These studies have demonstrated the critical role of HR practices and policies in defining the effects of age or racial diversity on firm performance and productivity.

In accordance with this emerging diversity literature, we draw on contingency theory, which postulates that no single best management method exists, and thus, business leaders should scrutinize organizational and environmental contextual factors to achieve an optimal strategic alignment for high performance (Donaldson, 2001; Mintzberg, 1979). We propose that diversity per se is neither a liability nor an asset to a firm; rather, diversity effects can be fully explained *only when* the role of organizational and contextual contingencies that surround a firm is considered. We focus on firm innovation instead of general firm performance or productivity because the former is a desirable and often-expected outcome of diversity (Horwitz & Horwitz, 2007).

The present study complements previous studies that focused on internal contingencies, such as HR policies or top management characteristics (Julian & Ofori-Dankwa, 2017; Kunze et al., 2013), by isolating the external environmental contexts of firms as significant firm-level contingencies for diversity. Strategy scholars have identified external

environment as a key contingency when considering firm situations (Richard et al., 2007). Following this stream, we identify two critical environmental contingencies in the diversity–firm innovation relationship: (a) high-tech industry and (b) market turbulence. High-tech industries resort to technology-based innovations and tend to be dominated by males and young employees (DiTomaso, Post, Smith, Farris, & Cordero, 2007); thus, they can be distinguished from traditional manufacturing and service industries as an increasingly significant industrial sector. Considering the focus of these high-tech industries on technological innovations and the dominance of specific demographic groups, examining the effects of diversity on firm innovation in such an industrial context presents practical and theoretical significance (Joshi & Roh, 2009). Market turbulence is another core environmental contingency, and it is a critical business challenge for organizations (Anderson & Tushman, 2001). Changing market demands create a substantial need to diversify resource pools to adapt to upcoming pressure (Cannella, Park, & Lee, 2008). Thus, high-tech industry and market turbulence reflect the environmental contexts of firms that involve technological and market demands, which generate distinct diversity-related dynamism and innovation pressure.

This study provides novel theoretical insights and practical guidelines for business leaders by examining critical environmental contingencies that channel the effects of diversity on firm innovation. Exploring the contingent effects of diversity at the firm level is important because (a) labor force diversity is increasing, inevitable, and becoming a critical managerial challenge in contemporary organizations (Kearney & Gebert, 2009; Kunze et al., 2013); (b) investigating firm situational factors enables us to further understand the possible processes underlying the activation of the positive or negative effects of diversity; and (c) such efforts can direct the engagement of top managers in active interventions and decisions targeted at firm processes and resource allocation, including diversity management (Julian & Ofori-Dankwa, 2017; Lam, 2005). To reveal these contingent effects, we validate the present conceptual framework by using time-lagged, multisource data collected from 178 Korean companies that represent various industries.

Conceptual framework and hypotheses

Inspired by the value-in-diversity hypothesis, extensive research has been conducted mostly at the individual and group levels of analysis (Hülsheger et al., 2009; Horwitz & Horwitz, 2007). A few studies conducted at the firm level have suggested that the age and racial diversity

of organizational members are negatively or curvilinearly related to firm performance (Julian & Ofori-Dankwa, 2017; Kunze, Boehm, & Bruch, 2011; Richard et al., 2007). However, most firm-level studies on diversity have focused on the membership diversity of top management teams (TMT) rather than the entire workforce of the organization (e.g. Ali, Kulik, & Metz, 2011; Bantel & Jackson, 1989; Talke et al., 2010). Considering that investigations of firm-level diversity as a predictor of firm innovation are insufficient and ambiguous, we investigate the implications of various aspects of firm-level diversity on firm innovation. The present study contributes to this emerging literature by theorizing and validating the effects of the demographic and status diversity of an entire organizational workforce on firm innovation. Our conceptual model is depicted in Figure 1.

Demographic and status diversity

To explore the effects of technology and market-related environmental contingencies, this study investigates two forms of workforce diversity. First, in line with existing diversity literature (Bell et al., 2011; Hülsheger et al., 2009), we examine the diversity of demographic attributes, such as gender and age. Second, we expand the notion of diversity by investigating the disparity generated by vertical differences and inequality in terms of status, prestige, resource control, and authority (Berger & Fişek, 2006; Bunderson, 2003). Organizational members are classified into different echelons or status levels, such as rank-and-file employees, managers, and executives (Groysberg, Polzer, & Elfenbein, 2011). The pattern and extent

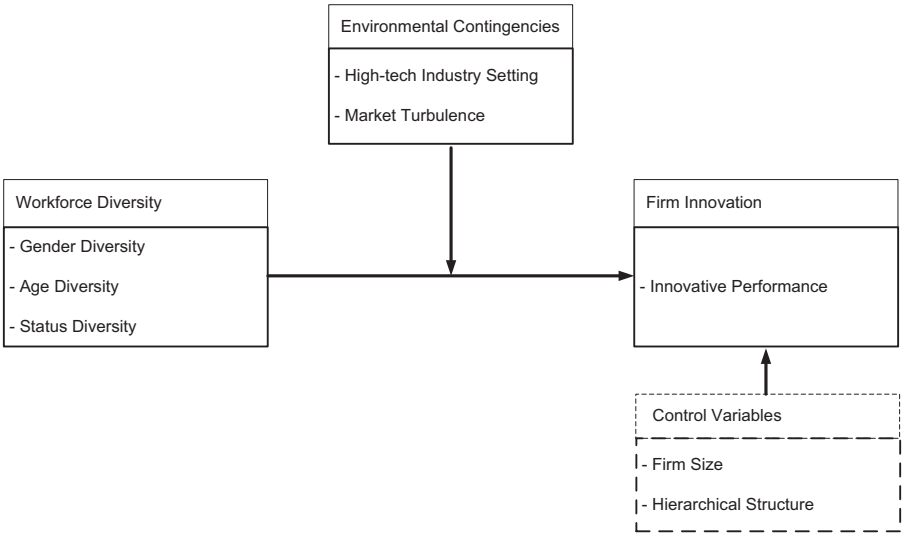

Figure 1. Theoretical framework of workforce diversity and firm innovation.

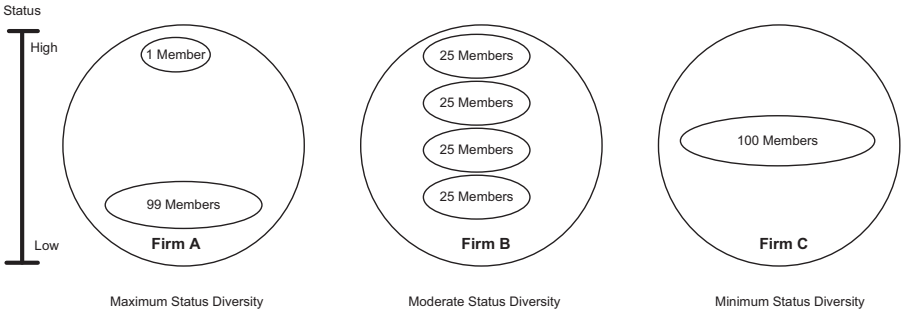

Figure 2. Three firms with differing degrees of status diversity.

to which members are allocated to different status levels vary across organizations. As illustrated in Figure 2, firm A consists of 100 members, with one member at the top and all other members at the bottom. In this case, 'one individual has everything and everyone else has nothing' (Allison, 1978, p. 869); thus, maximum status diversity exists (Harrison & Klein, 2007). Firm B also consists of 100 members; several members outrank others, and others occupy low positions. However, differences are somewhat diffused across members. Thus, moderate status diversity exists. In firm C, all 100 members occupy the same position in the middle, thereby indicating minimum diversity. This relatively new and evolving conceptualization of diversity examined in the present study should meaningfully expand the prevailing focus on demographic properties in diversity literature (Bell et al., 2011; Hülsheger et al., 2009; Kearney & Gebert, 2009).

Competing theoretical perspectives on diversity

Related literature offers varying theoretical perspectives that render both the negative and positive effects of diversity on innovation highly plausible. Innovation literature has endorsed the value of variation and heterogeneity in engendering innovation based on the potential informational benefit from the nonoverlapping backgrounds of constituting members (Swann, Polzer, Seyle, & Ko, 2004); we refer to this informational benefit from the positive side of diversity as '*process gain*' in this study. This view reflects the decision-making perspective and information elaboration theory or synergy perspective of diversity (Dwertmann, Nishii, & Van Knippenberg, 2016). Likewise, knowledge management literature suggests that integrating diverse knowledge and reconfiguring ideas from various sources are critical steps toward innovation (De Luca & Atuahene-Gima, 2007). Strategy research from a resource-based view has highlighted the significance of sourcing heterogeneous resources in

creating distinctive firm capabilities to achieve competitive advantages (Ray, Barney, & Muhanna, 2004).

However, the major theoretical underpinnings of diversity literature also emphasize the potential detriments of diversity. Self-categorization theory suggests that people categorize themselves into various social groups in which they share self-identity with in-group members (Horwitz & Horwitz, 2007; Jackson, Joshi, & Erhardt, 2003). Demographic diversity tends to generate subgroups and invigorates a discriminatory climate in organizations driven by in-group favoritism and stereotyping among subgroups, thereby impeding collaborative efforts among diverse members (Kunze et al., 2011, 2013). Similarly, the social chasm that results from status diversity and disparity may also create an institutional barrier that reduces the willingness of employees to collaborate for the development of innovative solutions (Van der Vegt, Van de Vliert, & Huang, 2005). In this sense, the potential informational benefit of diversity can be compromised by the '*process loss*' resulting from the potential negative side of diversity, such as dysfunctional intergroup tension due to the discrimination climate and difficulty of sharing task-related ideas and collaboration among members (Choi, Sung, & Zhang, 2017).

Contingency theory perspective on firm-level diversity

Existing studies have theorized and empirically substantiated the benefits and drawbacks of diversity (Dwertmann et al., 2016; Hülsheger et al., 2009). However, meta-analytic studies have frequently identified a non-significant or negligible direct relationship between diversity and performance (Horwitz & Horwitz, 2007; Jackson et al., 2003). Accordingly, diversity researchers have claimed that examining the main effects of diversity is unproductive, and they have called for the consideration of the boundary conditions of diversity effects (Ely & Thomas, 2001; McKay & Avery, 2015; Richard et al., 2007).

With the repeated calls for considering situational factors to reconcile cumulatively inconsistent findings, contingency theory has emerged as a promising alternative framework for diversity that complements the prevailing theoretical views, such as self-categorization and information-processing or synergy perspectives (Dwertmann et al., 2016; Guillaume, Dawson, Otaye-Ebede, Woods, & West, 2017; Joshi & Roh, 2009). In the development of contingency theory, organization theorists have long attempted to identify a match between the characteristics of the organization and those of its environment for high firm performance.

Contingency theory claims that the optimal course of managerial action depends on internal and external situations (Donaldson, 2001).

Expanding previous studies on contingency factors of diversity in group performance, Kunze et al. (2013) demonstrated the importance of a firm's internal characteristics (e.g. HR policy and TMT values) in shaping the effect of age diversity on firm performance. Julian and Ofori-Dankwa (2017) reported that the finding of Richard et al. (2007) regarding the curvilinear effect of racial diversity among firms with minority-friendly HR practices is inapplicable to a sample of firms with general high-commitment HR policies, in which the effect of racial diversity on firm productivity is linear and negative. We expand this emerging firm-level diversity literature based on the contingency perspective by focusing on the external or environmental characteristics of firms as boundary conditions for diversity effects on firm innovation. Specifically, we isolate two external contingencies that reflect technological and market environments to explain the contingent effects of firm-level diversity on firm innovation.

High-tech industry as a technological contingency for diversity

Distinct industry context defines the operating milieu for a firm. A high-tech industry refers to business areas characterized by a strong focus on technology, invention, involvement of a high percentage of scientists and engineers, intensive global competition, short-cycle knowledge, and technology-oriented product markets (Collins & Smith, 2006; DiTomaso et al., 2007). This industry typically comprises electronics, software, telecommunication, and biotech companies. Given its significance to technology and innovation, we identify high-tech industry as a core environmental contingency for firm-level diversity in generating innovation (Joshi & Roh, 2009).

The effects of demographic diversity on firm innovation may be influenced by the distinct demographic composition of a high-tech industry. According to the U.S. Bureau of Labor Statistics Report (Solis & Hall, 2011), women account for 47.2% of the entire U.S. labor force, but only a small percentage of women work in the high-tech industry (e.g. 7.2% electrical engineers and 7.5% telecommunications engineers). Moreover, the average ages of workers in most industries fall within the 45–54 age group whereas the majority of labor personnel in high-tech industries is distributed in the 35–44 age group. Similarly, in the current empirical context of Korea, women represent 37.5% of the entire labor force, but the ratio of women in the high-tech industry is low (e.g. 11.6% electrical engineers and 12.7% software engineers; Korean Statistical Information Service). The mean age of workers in the entire workforce is 44.4 years,

whereas that of workers in the high-tech industry is 37.5 years. These statistics indicate that young male workers dominate high-tech industries.

Stereotypical reactions against underrepresented groups are triggered in occupational settings dominated by members with particular demographic attributes (Wegge et al., 2008). Accordingly, a high-tech industry may create an engineering- and technology-centered culture that is frequently dominated by young male workers, and this culture accentuates dysfunctional social categorization (Joshi & Roh, 2009). Under such a corporate climate, female and old workers, who are often regarded as less suitable for and less technically competent in high-tech jobs such as engineering and software development, are likely to be the target of discrimination (Kunze et al., 2013), as explained below.

'As a senior engineer at Second Life in her 30 s, Bethanye Blount noticed people frequently would ask male colleagues questions that were in her area of expertise. And at meetings, she was often the one asked to take notes … These are not uncommon experiences for women in tech, according to the cover story in *The Atlantic* … "Why Is Silicon Valley So Awful to Women?" reports on the discrimination they experience, including being silenced or verbally attacked when expressing their opinions' (Mundy, 2017).

The biased demographic makeup of high-tech companies may stimulate stereotyping and develop a hostile atmosphere for demographic minorities (Ely & Thomas, 2001; Kunze et al., 2011). Such an atmosphere impedes effective interaction and free knowledge exchanges that are required to generate innovative solutions among members with different demographic profiles. Thus, demographic diversity in high-tech industries may lead to overall process loss related to diversity, which ultimately reduces the level of creativity and innovation of a firm (DiTomaso et al., 2007). Therefore, a high-tech industry may activate the potential detriment or process loss of demographic diversity, which in turn impedes innovative problem solving.

Hypothesis 1a. The high-tech industry moderates the relationship between gender diversity and firm innovation, such that the relationship is more negative in high-tech firms than in non-high-tech firms.

Hypothesis 1b. The high-tech industry moderates the relationship between age diversity and firm innovation, such that the relationship is more negative in high-tech firms than in non-high-tech firms.

The high-tech industry setting, which requires high levels of unconstrained idea exchanges to cope creatively with changing technological demands, may also function as a critical moderator for the relationship between status diversity and firm innovation. The central property of status diversity is power imbalance (Harrison & Klein, 2007). The fairness

and discrimination perspective on diversity climate concerns for fair and equitable treatment and eliminating the exclusion and/or silencing of marginalized groups resulting from social categorization, which materializes the benefit of diversity (Dwertmann et al., 2016). Unfortunately, status disparity undermines such fair and equitable interpersonal interactions and open communication because higher-status members dominate the communication by speaking more often, criticizing more, giving more commands, and interrupting others more frequently than their lower-status counterparts (Berger, Fişek, Norman, & Zelditch, 1977; Geddes & Konrad, 2003; Van der Vegt et al., 2005). Centralization of power or authority for only a small number of members may instigate interpersonal detriments and hinder knowledge sharing and idea generation among employees (Berger & Fişek, 2006). Such a process loss from status diversity may be particularly problematic for high-tech firms because these firms heavily depend on the open and free flow of ideas and knowledge among members, which allow the continual (re)design of original products and the exploration of technological breakthroughs (Joshi & Roh, 2009). Thus, we hypothesize the following.

Hypothesis 2. The high-tech industry moderates the relationship between status diversity and firm innovation, such that the relationship is more negative in high-tech firms than in non-high-tech firms.

Market turbulence as an environmental contingency for diversity

We propose market turbulence as another critical environmental contingency that shapes the nature of the diversity–innovation relationship. Market turbulence of a firm reflects the extent to which its business environment is dynamic and unpredictable and, thus, potentially threatening. Strategy scholars suggest that stable business environments allow firms to focus on routine, standardized operations; conversely, unstable environments require high adaptability, flexibility, and nonroutine activities (Anderson & Tushman, 2001; Choi, Sung, & Kim, 2010). However, inherently fluid and uncertain business environments constrain resource availability while simultaneously offering new opportunities to be explored and exploited creatively (Bhide, 2000; Rindova & Fombrun, 2001). In this regard, unstable environments characterized by turbulent market trends may require an extensive and diverse pool of cognitive resources (Bunderson & Sutcliffe, 2002).

Workforce diversity is beneficial for firms in turbulent markets because diversity supplies rich cognitive resources that are required for generating variations and flexible reactions to changing consumer demands and shifting market trends (Cannella et al., 2008; Sung & Choi,

2012). A workforce with diverse demographic backgrounds may involve distinct life experiences, heterogeneous skills, and diverging viewpoints and market insights, all of which are advantageous for firms to address fluctuating market demands (Ali et al., 2011; Dwyer, Richard, & Chadwick, 2003; Kearney & Gebert, 2009). Moreover, demographic diversity generates a climate conducive for firm innovation. When a firm lacks diversity, employees may experience difficulties in challenging the status quo because homogeneous members tend to pursue uniformity and feel reluctant to confront or disagree with one another because of the presumption of similarity (Phillips & Loyd, 2006). By contrast, the presence of heterogeneous members creates a milieu that allows employees to express dissenting ideas and accept dissimilar viewpoints, thereby promoting the exploration of new possibilities. Therefore, a highly turbulent environment may unleash the value of demographic diversity, providing a firm with diversified cognitive resources and flexibility in responding to unpredictable and dynamic market challenges (Anderson & Tushman, 2001).

Hypothesis 3a. Market turbulence moderates the relationship between gender diversity and firm innovation, such that the relationship is more positive for firms with high market turbulence than for firms with low market turbulence.

Hypothesis 3b. Market turbulence moderates the relationship between age diversity and firm innovation, such that the relationship is more positive for firms with high market turbulence than for firms with low market turbulence.

We also propose that market turbulence may activate the potential positive effects of status diversity on firm innovation. Indeed, centralized power and authority that accompany status diversity can engender process loss by diminishing open communication among members (Choi et al., 2017; Harrison & Klein, 2007; Van der Vegt et al., 2005). However, status diversity can provide a process gain toward innovation when speedy and adaptive responses are required to address rapidly developing market challenges. For example, the world's largest coffee retailer, Starbucks, was forced to shut down 600 stores that were not making profits during the economic crisis in 2008; it closed another 300 stores and laid off 6700 employees in 2009. Facing this crisis, the founder and former CEO of Starbucks, Howard Schultz, took the dramatic step of coming back as CEO and engaged in a companywide effort to change the corporate culture back to what it had been before its expansion. He successfully pulled Starbucks out of the financial meltdown of 2008 and achieved a turnaround. In such crisis situations, status diversity may be advantageous in identifying innovative actions and implementing them with enormous drive to achieve successful adaptation to market demands.

When firms lack a clear status differential, they may experience difficulty in identifying innovative solutions and implementing them in a timely manner because members tend to engage in status conflict, deny others' suggestions, and become unwilling to share innovative ideas (Groysberg et al., 2011). According to the functional perspective of status, status diversity establishes a clear communication structure, division of labor, and role expectation, thereby facilitating the coordinated collective action of a group (Choi et al., 2017). Thus, a firm that operates in a turbulent market amid changing consumer demands may accrue considerable innovation benefits from status diversity, which accelerates organizational functions, such as rapid problem solving, applying new procedures, and introducing new products. Thus, we advance the following hypothesis.

Hypothesis 4. Market turbulence moderates the relationship between status diversity and firm innovation, such that the relationship is more positive for firms with high market turbulence than for firms with low market turbulence.

Method

Sample and data collection

Our research framework that investigates the contingent effects of various dimensions of workforce diversity on firm innovation faces various research design challenges, such as a sufficient firm-level sample for statistical analysis, multiple sources for avoiding same-source bias, and temporal separation of data for testing predictive (instead of postdictive or concurrent) relationships. Given these challenges, we decided to use the Human Capital Corporate Panel data archived by the Korea Research Institute for Vocational Education and Training (KRIVET) in cooperation with the Korean Ministry of Labor. KRIVET conducted a stratified, random sampling on 1851 private business organizations with 100 or more employees listed in the Korea Investors Service database by considering the industry, organization, size (i.e. 100–299, 300–999, 1000–1999, and over 2000), and ownership type (i.e. publicly or privately owned). KRIVET randomly selected approximately 25% of the organizations from each cell of the matrix to avoid potential over- or under-sampling of specific cells. Firm-level data were collected at two time points: 2007 (T1, $N = 464$) and 2009 (T2, $N = 473$). From the initial sample, we identified 178 companies that participated in both waves of data collection and provided suitable information to examine the present theoretical framework. The final analysis sample of 178 companies represents 15 industries (see Table 1 for detailed descriptive information of the current sample).

Table 1. Sample description.

Classifications		Categories	Frequency (percentage) Firm-level	Frequency (percentage) Individual-level	High-tech industry	Non-high-tech industry
Entire sample			*N*=178	*N*=4957		
Firm size		100 to 299	*N*= 65 (36.5%)	–		
		300 to 999	*N*= 73 (41.0%)	–		
		1000 to 2999	*N*= 19 (10.7%)	–		
		more than 3000	*N*= 21 (11.8%)	–		
Industry type		Computer	*N*= 06 (03.4%)	–		
	High-tech Industries	Electronics	*N*= 10 (05.6%)	–		
		Electrical appliance	*N*= 19 (10.7%)	–		
		Telecommunication	*N*= 05 (02.8%)	–		
		Software/system/online DB	*N*= 11 (06.2%)	–		
		Food	*N*= 13 (07.3%)	–		
		Fiber	*N*= 03 (01.7%)	–		
		Chemical	*N*= 23 (12.9%)	–		
		Plastic	*N*= 06 (03.4%)	–		
	Non-high-tech Industries	Steel	*N*= 22 (12.4%)	–		
		Machinery	*N*= 19 (10.7%)	–		
		Automobile	*N*= 23 (12.8%)	–		
		Professional service	*N*= 13 (07.3%)	–		
		Personnel agency service	*N*= 02 (01.1%)	–		
		Entertainment	*N*= 03 (01.7%)	–		
Gender		Male	–	*N*= 760 (83.8%)	*N*= 426 (80.5%)	*N*= 894 (86.2%)
		Female	–	*N*= 0 147 (16.2%)	*N*= 0 157 (19.5%)	*N*= 0 143 (13.8%)
Age		30 or younger	–	*N*= 0 207 (23.6%)	*N*= 0 175 (30.0%)	*N*= 0 221 (22.1%)
		31–40	–	*N*= 352 (40.1%)	*N*= 277 (47.6%)	*N*= 383 (38.3%)
		41–50	–	*N*= 243 (27.7%)	*N*= 111 (19.1%)	*N*= 297 (29.7%)
		51 or older	–	*N*= 77 (08.6%)	*N*= 19 (03.3%)	*N*= 100 (9.9%)
Organizational hierarchy		Entry level	–	*N*= 162 (33.3%)	*N*= 102 (24.8%)	*N*= 186 (36.0%)
		Associate	–	*N*= 117 (24.2%)	*N*= 113 (27.4%)	*N*= 119 (23.0%)
		First-line manager	–	*N*= 92 (18.9%)	*N*= 98 (23.8%)	*N*= 90 (17.4%)
		Middle manager	–	*N*= 58 (11.9%)	*N*= 51 (12.4%)	*N*= 61 (11.8%)
		General manager	–	*N*= 0 040 (08.2%)	*N*= 37 (09.0%)	*N*= 0 041 (07.9%)
		Executive	–	*N*= 00 17 (03.5%)	*N*= 00 11 (02.7%)	*N*= 00 20 (03.9%)

Note. Individual level value represents the mean value of demographic information reported by HR directors of 178 firms.

The T1 sample consisted of each company's human resource (HR) directors who provided the information used to compute the firm-level diversity variables. The T2 sample was composed of 178 strategy directors who reported on two moderators (i.e. high-tech industry setting and environmental turbulence), firm innovation, and the control variable. In T2, firm innovation was also rated by 943 department managers (an average of 5.30 per company), 96.6% of which were males with a mean age of 44.8 years ($SD = 8.78$) and an average tenure of 14.3 years ($SD = 7.01$).

Measures

Demographic and status diversity (HR director, T1)

The HR directors reported the composition of employees in their companies based on the following characteristics: (a) gender (0 = female and 1 = male); (b) age (1 = 30 years or below, 2 = 31–40 years, 3 = 41–50 years, and 4 = 51 years or older); and (c) hierarchical position (1 = entry level, 2 = associate, 3 = first-line manager, 4 = middle manager, 5 = general manager, and 6 = executive). In the present theoretical framework, gender and age diversity are regarded as a 'variety' in which members differ from one another in their experiences and information bases (Harrison & Klein, 2007). Thus, as recommended, we operationalized workforce diversity as categorical variability (Bell et al., 2011; Harrison & Klein, 2007). To this end, we computed the Index of Quality Variation (IQV) (Agresti & Agresti, 1978; Mueller, Schuessler, & Costner, 1970) using the following equation.

$$\frac{K}{K-1}\left(1-\sum_{i=1}^{K}(p_i/100)^2\right),$$

where K is the number of categories and P_i is the proportion of the sample that lies in the ith category. IQV standardizes Blau's heterogeneity index by dividing it by its theoretical maximum, thereby offering a normalized measure of diversity for the current analysis. We operationalized status diversity using the coefficient of variation, which was computed by dividing the standard deviation (SD) of the status of organizational members by the mean status. In this formula of $SD(D)/D\text{mean}$, diversity as disparity is operationalized by reflecting 'both the distances between unit members and the dominance of (concentration of the resources in) those who have higher amounts of attribute D' (Harrison & Klein, 2007, p. 1212).

High-tech industry (strategy director, T2)

The moderator variables were reported by strategy directors. A dummy code for the industry (0 = non-high-tech and 1 = high-tech) was created for the high-tech industry. The following industries in the high-tech category consisted 28.7% of the sampled firms: computer, electronics, electrical appliance, software/system/online database, and telecommunication. These industries were recognized as high-tech in previous studies (Collins & Smith, 2006; Lovelace, Shapiro, & Weingart, 2001).

Market turbulence (strategy director, T2)

Strategy directors assessed the level of market turbulence in their firm by rating the following items (α =.96): (a) 'In our business, it is very hard to predict changes in market and consumer demands' (1 = *strongly disagree*, 5 = *strongly agree*) and (b) 'In the past two years, how can you characterize the market trend in the demand for the main products of your company?' (1 = *minimal change*, 5 = *considerable change*).

Firm innovation (strategy director and department manager, T2)

To evaluate the level of firm innovation, we employed the report of the strategy directors on the level of new product development (NPD): 'In the past two years, to what extent did your company develop and introduce new products?' (1 = *not at all*, 5 = *a great deal*). In addition, approximately five department managers per company provided ratings of the product/service differentiation of their respective companies by responding to the following item ($r_{wg(1)}$ =.75, ICC(1) = .18, ICC(2) = .58, $F = 2.38$, $p < .001$): 'Our company has a competitive advantage over other companies in terms of introducing differentiated products and/or services' (1 = *not at all*, 5 = *a great deal*). The two items (α = .83) reported by the strategy directors and department managers were averaged to create the measure of firm innovation.

Control variable (HR director and strategy director)

The present analysis included firm size as a control variable because it is a critical firm-specific determinant of firm innovation (Stock, Greis, & Fischer, 2002). In this study, firm size (indicated by the number of employees) was transformed using a logarithm function to reduce the undue effects of large firms (Bantel & Jackson, 1989; Collins & Smith, 2006). The current analysis also controlled the number of hierarchical levels, a typical measure of hierarchical organizational structure. By including the number of hierarchical levels, the analysis of the present study excluded the alternative explanation based on organizational

structure, which should be differentiated from status diversity among members. According to the HR directors' report in T1, the firms in the present sample had an average of 10.5 hierarchical levels (e.g. entry level, staff, senior staff, assistant manager, deputy manager) ranging from 4 to 16.

Results

The descriptive statistics and correlations among the study variables are reported in Table 2. Hierarchical regression equations were used to test the hypotheses. Table 3 shows the results of the stepwise hierarchical regression analysis. Firm size was a meaningful predictor of firm innovation ($\beta = .25$, $p < .01$). Market turbulence was positively associated with firm innovation ($\beta = .23$, $p < .01$). Gender and status diversity exerted positive effects on firm innovation ($\beta = .28$, $p < .001$ and $\beta = .19$, $p < .01$, respectively).

Moderating effects of high-tech industry

To test the moderation hypotheses, all variables were mean-centered to reduce the multicollinearity among the main effect variables and their interaction terms (Aiken & West, 1991). The interaction terms were entered after controlling the main effects. As shown in Table 2, we conducted two sets of hierarchical moderated regressions by separating demographic diversity (i.e. gender and age diversity) and status diversity for two reasons. First, as presented in the hypothesis development section, demographic, and status diversity represent distinct dimensions of diversity that are driven by distinct underlying mechanisms. Second, considering the modest sample size at the firm level, testing all six interaction terms simultaneously in a single equation may result in multicollinearity and low statistical power. (results with all six interaction terms in a single equation available upon request).

Table 2. Means, *SD*, and correlations among study variables.

Variables	*M*	*SD*	1	2	3	4	5	6	7	8
1. Firm size	6.14	1.08	–							
2. Hierarchical structure	10.5	1.93	.04	–						
3. Gender diversity	.44	.21	−.22**	−.16*	–					
4. Age diversity	.81	.13	.15*	.18*	−.15	–				
5. Status diversity	.59	.11	−.23**	.19*	.25**	.19*	–			
6. High-tech industry setting	.29	.45	−.17*	−.08	.07	−.37**	−.02	–		
7. Market turbulence	2.48	.72	.09	.08	.01	−.09	.04	.17*	–	
8. Firm innovation	.01	.80	.22**	.02	.22**	.02	.15	−.05	.25**	–

Note. Unit of analysis is organization ($N = 178$).
*$p < .05$;
**$p < .01$.

Table 3. Results of hierarchical regression analyses predicting firm innovation.

	Demographic (Gender & Age) diversity			Status diversity	
Predictors	Model 1	Model 2	Model 3	Model 4	Model 5
Firm Size	.25**	.25**	.24**	.24**	.23**
Hierarchical Structure	.03	.03	.04	−.05	−.04
Gender Diversity (GenderDiver)		.28***	.29***		
Age Diversity (AgeDiver)		.01	−.02		
Status Diversity (StatusDiver)				.19**	.19**
High–tech Industry Setting (HighTech)		−.06	−.03	−.04	−.08
Market Turbulence (MarketTurb)		.23**	.26***	.23**	.26**
GenderDiver* HighTech			−.08		
GenderDiver* MarketTurb			.15*		
AgeDiver* HighTech			.16*		
AgeDiver* MarketTurb			−.07		
StatusDiver* HighTech					−.06
StatusDiver* MarketTurb					.20*
F	4.94**	6.19***	5.01***	5.56***	5.00***
R^2	.05	.18	.23	.14	.17
ΔR^2		.13***	.05*	.09**	.03*

Note. $N = 178$. Standardized beta coefficients are shown.
*$p < .05$;
**$p < .01$;
***$p < .001$.

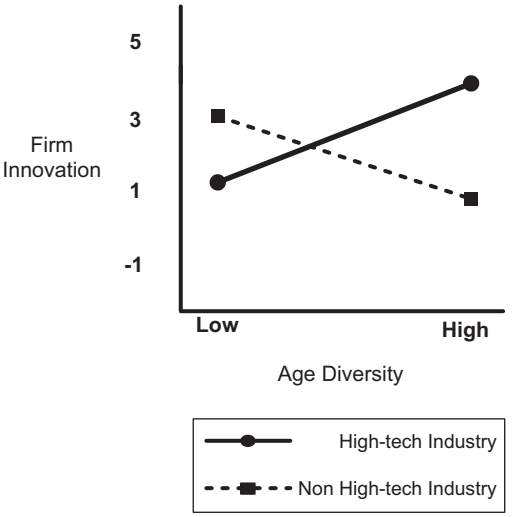

Figure 3. Interaction of age diversity and high-tech industry in predicting firm innovation.

In Hypothesis 1 b, we proposed that the high-tech industry moderates the relationship between age diversity and firm innovation. Our analysis showed a significant positive (instead of hypothesized negative) interaction between high-tech industry and age diversity ($\beta = .16$, $p < .05$; see Model 3, Table 3). This significant interaction was investigated further through a simple slope analysis (Aiken & West, 1991). Figure 3

demonstrates that age diversity increases firm innovation for firms in high-tech industries, but not for those in non-high-tech industries (b = .47, $p < .05$ and b = -.39, *ns*., respectively), which was the opposite of Hypothesis 1 b. This counterintuitive pattern will be discussed later. The interactions between high-tech industry and gender diversity and between high-tech industry and status diversity were not significant, thereby rejecting Hypotheses 1a and 2.

Moderating effects of market turbulence

Hypotheses 3 and 4 posit that market turbulence moderates the relationships between demographic (i.e. gender and age) and status diversity and firm innovation. The interaction between market turbulence and gender diversity was significant and positive (β = .15, $p < .05$; see Model 3, Table 3). Plot A of Figure 4 illustrates that gender diversity contributes to innovation for firms with high market turbulence but not for firms with low turbulence (b = .97, $p < .001$ and b = .16, *ns*., respectively), supporting Hypothesis 3a. The interaction of age diversity and market turbulence was not significant, rejecting Hypothesis 3b.

In line with Hypothesis 4, market turbulence significantly moderated the effect of status diversity on firm innovation (β = .20, $p < .05$; see Model 5, Table 3). In Figure 4, Plot B shows that status diversity increases innovation for firms in more turbulent markets (b = .60, $p <$ .05) but decreases innovation for firms in less turbulent markets (b = −.62, $p < .01$), thereby supporting Hypothesis 4.

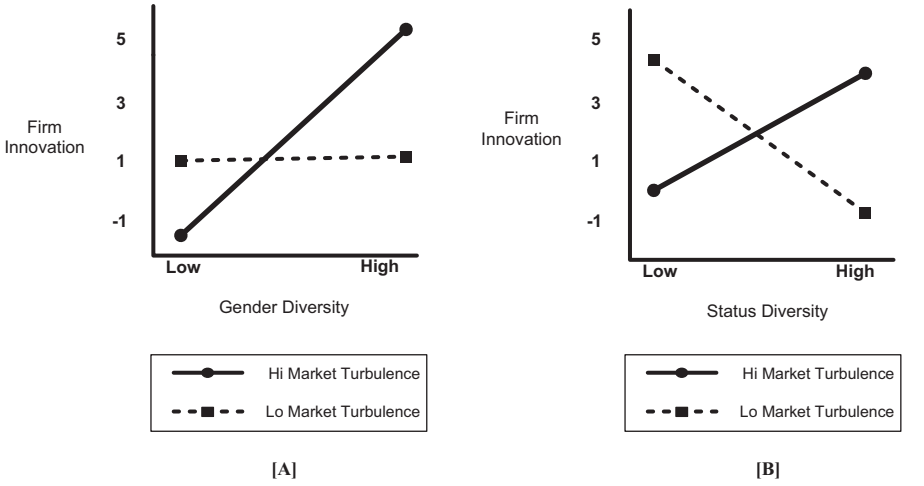

Figure 4. Interaction of workforce diversity and market turbulence in predicting firm innovation.

Robustness of the empirical findings

We performed several post hoc analyses to check the robustness of the current findings (all result tables of post hoc analyses are available upon request to the first author). First, in the present analysis, we simultaneously entered the two environmental contingencies into the equation because testing the moderating effects of technological and market environmental contingencies together rather than in a piecemeal manner provides an omnibus test of the current framework. To further verify the current empirical patterns, we tested the effects of the two environmental contingencies in separate equations. The overall pattern of the results based on these alternative analytic approaches was identical to the current findings based on the omnibus test of moderators, which further demonstrates the robustness of the results.

Second, we identified the high-tech industry as a critical technological environmental contingency for firm innovation. In strategic management literature, considerable research has been conducted to compare service versus manufacturing industries as a key industrial contingency (e.g. Keck, 1997; Richard et al., 2007). Compared with manufacturing firms, service firms may require broader perspectives to properly appreciate various feedback from diverse clientele and, thus, activate the value of workforce diversity toward firm innovation (Joshi & Roh, 2009). Thus, we further tested the moderating effects of the service industry that includes entertainment, tourism, and broadcasting. The results did not support any significant interaction between the service industry and demographic and status diversity in predicting firm innovation (all $p > .50$).

Finally, considering the interrelatedness between status diversity and hierarchical organizational structure, we tested the possibility that the current environmental contingencies moderate the effect of hierarchical structure on firm innovation. The analysis showed no significant interactions, demonstrating the distinctiveness of hierarchical organizational structure and workforce status diversity.

Discussion

Considering inconsistent empirical findings reporting both negative and positive implications of diversity on firm performance, we employed the contingency theory perspective consistent with the emerging direction in diversity literature (Dwertmann et al., 2016; Guillaume et al., 2017; Joshi & Roh, 2009). Complementing the extant focus on internal firm characteristics, we identified firm environmental contingencies that may determine the value of diversity for firm innovation. The present study

enriches firm-level diversity literature by examining the innovation implications of the diversity of the entire organizational membership, which have been largely ignored in diversity and innovation literature. Moreover, we extend the notion of diversity from the prevailing focus on demographic diversity to the status diversity of members (Berger & Fişek, 2006; Bunderson, 2003; Choi et al., 2017). The current empirical analysis demonstrated the changing values of workforce diversity toward firm innovation contingent on technological and market environmental contexts. The important findings of the study and their theoretical and practical implications, limitations, and directions for future research are discussed below.

Implications for theory

Contrary to our theoretical expectation, the potential positive (but not negative) effect of age diversity on firm innovation was activated in high-tech firms. Age diversity increases firm innovation for high-tech firms, but not for non-high-tech firms (Figure 3). This unexpected and counterintuitive pattern appears to suggest new theoretical possibilities. Our follow-up analysis of the present sample revealed that the average level of age diversity in high-tech firms differs from that in non-high-tech firms (mean age diversity = .74 and .85, respectively, mean difference test: $p < .001$), indicating a lower age diversity in high-tech firms. Moreover, employees of high-tech firms are younger than those in other firms (mean age = 35 and 46, respectively, mean difference test: $p < .001$). The relatively less-age-diverse and young workforce of high-tech firms indicates that employees in high-tech industries are in similar life and career stages; people compete against others with a similar age for the same resources and positions in organizations (Choi, 2007). Diversifying the age composition could be particularly effective and beneficial in such a circumstance. Age-diverse workforce composition may relieve employees of interpersonal strain and destructive competitive behavior that hinder the free knowledge sharing required for innovation (Choi et al., 2017). Moreover, older employees in high-tech firms may function as repositories of knowledge and history related to product development and innovation activities, which might facilitate knowledge accumulation and amalgamation. These speculations are in line with the synergy perspective of diversity, which underscores that the value in diversity emerges only under the appropriate conditions that activate its positive functions (Dwertmann et al., 2016).

Our analysis further showed that market turbulence activates the potential positive sides and process gain from workforce diversity toward

firm innovation. The present empirical findings revealed that dynamic market trends and fluid customer demands may enhance the value of diversity in responding to such challenges by supplying rich reservoir of knowledge and perspectives (Sung & Choi, 2012). As expected, the effect of gender diversity on firm innovation was positive only for firms operating in a highly turbulent market. By breaking the uniformity in the demographic composition, gender diversity can increase the likelihood that employees will feel comfortable in expressing dissenting ideas, which is particularly beneficial for understanding and adapting to changing customer demands (Phillips & Loyd, 2006).

Furthermore, status diversity contributes to firm innovation only for firms facing high market turbulence. This pattern endorses the functional perspective of status disparity for firms dealing with highly competitive and uncertain environmental changes. The centralized power structure is often effective in coping with environmental challenges by allowing for timely decisions and prompt implementation (Choi et al., 2010). However, in a stable market environment, such factors can exert a negative effect on firm innovation, as shown in Figure 4, Plot B, by imposing strong hierarchical control, which may enforce the execution of standardized procedures. The contrasting effects of status diversity on firm innovation in high versus low market turbulence encourage further applications of the contingency theory perspective in understanding the effects of diversity on firm innovation.

Implications for practice

The present analysis also offers practical implications for business leaders. First, the value function of the demographic diversity of organizational members can change dramatically depending on the environmental contingencies related to a firm's technology and market. For example, firms facing changing market demands may diversify their gender composition to achieve the value of diversity. Likewise, high-tech firms can increase innovation by enhancing age variations among employees, considering their relatively young and age-homogeneous workforce. Under unfavorable environmental contingencies for demographic diversity, such as relatively stable market conditions, firms should carefully manage diversity-related practices (e.g. diversity awareness training and mentoring programs) to prevent the formation of a potentially discriminatory climate and negative stereotyping toward a specific subgroup.

Second, contrary to the prevailing belief (Berger & Fişek, 2006; Van der Vegt et al., 2005), the present analysis demonstrated that status

diversity can be positive for firm innovation depending on the environmental contingency. Hence, organizations should manage the distribution of employees to different organizational echelons rather than simply counting the number of hierarchical levels to flatten the structure. Managers should understand that status diversity can be beneficial in specific environmental contexts, such as turbulent markets and stressful situations. Status diversity may accelerate the adaptive reactions of firms to dynamically changing environmental demands and expedite the coordinated mobilization of organizational resources to cope with such demands (Richard et al., 2007). Consequently, business leaders should properly analyze environmental situations surrounding their firms to select an optimal level of status diversity instead of blindly endorsing or avoiding it.

The caveat is that diversity can be beneficial or detrimental depending on various organizational contingencies. Although, this study focused on the external environment, the effect of diversity on firm outcomes may also depend on internal organizational characteristics, such as the top manager's value orientations toward diversity and the HR practices related to diversity (Kunze et al., 2013; Julian & Ofori-Dankwa, 2017). Notably, business leaders need to create an organizational climate for creating synergy (e.g. knowledge sharing and building broad knowledge reservoir and collaboration) from diversity by ensuring fair treatment and practices; consequently, all employees raise their voice and involve in organizational processes (Dwertmann et al., 2016; McKay & Avery, 2015). Such diversity climate is needed because merely possessing a diverse workforce is insufficient to obtain positive outcomes of diversity, such as innovation. Diversity studies noted that discrimination against minority should subside as the number of minority increases (Ely & Thomas, 2001). Accordingly, industrial policies that consistently encourage and support the recruitment of and equal opportunities for minority may help firms achieve process gain and synergy effects from diverse workforce.

Study limitations and future research directions

The current research design has several strengths, such as time-lagged multisource data and large sample size at the firm level. However, the present findings should be interpreted with caution considering several limitations, which also indicate recommended directions for further studies. First, the present measure of innovation could limit the generalizability of the present findings. Product/service differentiation has been used as an indicator of firm innovation in previous studies (Ahuja, 2000;

Cohen, Goto, Nagata, Nelson, & Walsh, 2002). Although, the current data did not show any difference across industries (all $p > .50$), considering that the meaning of these indicators can vary across industries, further exploration of distinct empirical patterns in different industries using alternative measures of firm innovation is necessary.

Second, in explaining the role of contingencies in the relationship between diversity and firm innovation, we presumed that environmental contingencies activate the potential negative or positive effects of diversity by instigating process loss (e.g. discrimination climate, stereotyping) or process gain from diversity (e.g. flexible cognitive processing, speedy problem solving). However, we did not empirically test such intervening mechanisms. Future theoretical and empirical endeavors are needed to achieve a comprehensive understanding of the intermediate processes between diversity and firm innovation.

Third, the research context of Korean companies could have affected the current empirical patterns. Korean culture generally exhibits a relatively high degree of preference for men and the prevalence of male dominance in business organizations (Hofstede, 1980; Kee, 2008). Such strong gender-based roles and norms may have affected the effects of gender diversity observed in the present data. Future research should validate the current framework by using data from other cultural contexts characterized by varying gender-related values.

Fourth, although, we treated market turbulence as a distinct firm-specific environmental contingency, market turbulence could be regarded as an industry-level property or even as a macro-economic condition, such that firms in the same industry or country would be exposed to a similar market situation. Thus, we tested if the between-industry variance of market turbulence was statistically significant. The result was not significant ($F = 1.46$, $p > .10$), indicating no significant industry-level variation (between-industry difference) in market turbulence. Future research should consider additional industry or macrolevel environmental contingencies in explaining the firm-level diversity–innovation link.

Finally, our analysis showed insignificant and even unexpected interaction patterns between diversity and innovation in high-tech firms. These counterintuitive patterns may be partly due to the under-specification of the present theoretical model. On the one hand, prior research suggested that task-oriented diversity (e.g. education and functional background diversity) exerts stronger effects on performance than relationship-oriented diversity (e.g. gender and age) in the technological and intellectual task settings (Joshi & Roh, 2009). Future research should explore the implications of task-related workforce diversity with regard to firm innovation under varying environmental contingencies. On the

other hand, merely possessing a diverse workforce is insufficient to obtain positive outcomes of diversity (Ely & Thomas, 2001). To unleash the potential benefit of workforce diversity, firms need to nurture diversity climate, which reflects employees' perceptions about the extent to which organizations value diversity through the formal structure, informal values, and social integration of under-represented employees (Dwertmann et al., 2016; McKay & Avery, 2015). Thus, the omission of such climate or other enabling factors could be a reason for the current insignificant or counterintuitive findings. Further conceptual and empirical endeavors should be directed to develop a comprehensive investigation of these additional contingencies.

Conclusion

Drawing on the contingency perspective, this study expanded diversity–innovation literature to the firm level with an elaborate consideration of boundary contingencies and the inclusion of demographic- and structurally driven status diversity. The empirical analysis clearly demonstrated that the effects of demographic and status diversity on firm innovation are dependent on environmental contingencies that reflect a firm's technological and market contexts. By examining these environmental contingencies, this study further complemented recent diversity studies that primarily focused on internal firm contingencies as moderators of the diversity–performance relationship (Julian & Ofori-Dankwa, 2017). This study provided theoretical insights into the contextual and situational contingencies that shape the meaning and function of diversity toward firm innovation and presented practical insights for managing workforce diversity and designing organizational structures.

References

Agresti, A., & Agresti, B. F. (1978). Statistical analysis of qualitative variation. *Sociological Methodology*, *9*, 204–237. doi:10.2307/270810

Ahuja, G. (2000). Collaboration networks, structural holes, and innovation: A longitudinal study. *Administrative Science Quarterly*, *45*(3), 425–455. doi:10.2307/2667105

Aiken, L. S., & West, S. G. (1991). *Multiple regression: Testing and interpreting interactions*. Newbury Park, CA: Sage.

Ali, M., Kulik, C. T., & Metz, I. (2011). The gender diversity-performance relationship in services and manufacturing organizations. *International Journal of Human Resource Management*, *22*(7), 1464–1485. doi:10.1080/09585192.2011.561961

Allison, P. D. (1978). Measures of inequality. *American Sociological Review*, *43*(6), 865–880. doi:10.2307/2094626

Anderson, P., & Tushman, M. L. (2001). *Organizational environments and industry exit: The effects of uncertainty, munificence and complexity*. Oxford, UK: Oxford University Press.

Bantel, K., & Jackson, S. E. (1989). Top management and innovations in banking: Does the composition of the top team make a difference? *Strategic Management Journal*, *10*(S1), 107–124. doi:10.1002/smj.4250100709

Bell, S. T., Villado, A. J., Lukasik, M. A., Belau, L., & Briggs, A. L. (2011). Getting specific about demographic diversity variable and team performance relationships: A meta-analysis. *Journal of Management*, *37*(3), 709–743. doi:10.1177/0149206310365001

Berger, J., & Fişek, M. H. (2006). Diffuse status characteristics and the spread of status value: A formal theory. *American Journal of Sociology*, *111*(4), 1038–1079. doi:10.1086/498633

Berger, J., Fişek, M. H., Norman, R. Z., & Zelditch, M. Jr. (1977). *Status characteristics and Social Interaction*. New York: Elsevier.

Bhide, A. (2000). *The origin and evolution of new businesses*. New York: Oxford.

Bunderson, J. S. (2003). Recognizing and utilizing expertise in work groups: A status characteristics perspective. *Administrative Science Quarterly*, *48*(4), 557–591. doi:10.2307/3556637

Bunderson, J. S., & Sutcliffe, K. M. (2002). Comparing alternative conceptualizations of functional diversity in management teams: Process and performance effects. *Academy of Management Journal*, *45*, 875–893. doi:10.2307/3069319

Cannella, A. A., Jr. Park, J. H., & Lee, H. U. (2008). Top management team functional background diversity and firm performance: Examining the roles of team member colocation and environmental uncertainty. *Academy of Management Journal*, *51*, 768–784. — doi:10.5465/AMJ.2008.33665310

Choi, J. N. (2007). Group composition and employee creative behaviour in a Korean electronics company: Distinct effects of relational demography and group diversity. *Journal of Occupational and Organizational Psychology*, *80*(2), 213–234. doi:10.1348/096317906X110250

Choi, J. N., Sung, S. Y., & Kim, M. U. (2010). How do groups react to unexpected threats? Crisis management in organizational teams. *Social Behavior and Personality: An International Journal*, *38*(6), 805–828. doi:10.2224/sbp.2010.38.6.805

Choi, J. N., Sung, S. Y., & Zhang, Z. T. (2017). Workforce diversity in manufacturing companies and organizational performance: The role of status-relatedness and internal processes. *International Journal of Human Resource Management*, *28*(19), 2738–2761. doi:10.1080/09585192.2016.1138315

Cohen, W. M., Goto, A., Nagata, A., Nelson, R. R., & Walsh, J. P. (2002). R&D spillovers, patents, and the incentives to innovate in Japan and the United States. *Research Policy*, *31*, 1349–1367.

Collins, C. J., & Smith, K. G. (2006). Knowledge exchange and combination: The role of human resource practices in the performance of high-technology firms. *Academy of Management Journal*, *493*, 544–560. doi:10.5465/amj.2006.21794671

De Luca, L., & Atuahene-Gima, K. (2007). Market knowledge dimensions and cross-functional collaboration: Examining the different routes to product innovation performance. *Journal of Marketing*, *71*(1), 95–112. doi:10.1509/jmkg.71.1.95

DiTomaso, N., Post, C., Smith, D. R., Farris, G. F., & Cordero, R. (2007). Effects of structural position on allocation and evaluation decisions for scientists and engineers in industrial R&D. *Administrative Science Quarterly*, *52*, 175–207.

Donaldson, L. (2001). *The contingency theory of organizations*. Thousand Oaks, CA: Sage.

Dwertmann, D. J. G., Nishii, L. H., & Van Knippenberg, D. (2016). Disentangling the fairness & discrimination and synergy perspectives on diversity climate: Moving the field forward. *Journal of Management*, *42*, 1136–1168. doi:10.1177/0149206316630380

Dwyer, S., Richard, O. C., & Chadwick, K. (2003). Gender diversity in management and firm performance: The influence of growth orientation and organizational culture. *Journal of Business Research*, *56*(12), 1009–1019. doi:10.1016/S0148-2963(01)00329-0

Ely, R. J., & Thomas, D. A. (2001). Cultural diversity at work: The effects of diversity perspectives on work group processes and outcomes. *Administrative Science Quarterly*, *46*(2), 229–273. doi:10.2307/2667087

Geddes, D., & Konrad, A. M. (2003). Demographic differences and reactions to performance feedback. *Human Relations*, *56*(12), 1485–1513. doi:10.1177/00187267035612003

Greenhalgh, T., Glenn, R., Bate, P., Macfarlane, F., & Kyriakidou, O. (2007). *Diffusion of innovations in health service organisations: A systematic literature review*. Oxford, UK: Blackwell Publishing.

Groysberg, B., Polzer, J. T., & Elfenbein, H. A. (2011). Too many cooks spoil the broth: How high-status individuals decrease group effectiveness. *Organization Science*, *22*(3), 722–737. doi:10.1287/orsc.1100.0547

Guillaume, Y. R. F., Dawson, J. F., Otaye-Ebede, L., Woods, S. A., & West, M. A. (2017). Harnessing demographic differences in organizations: What moderates the effects of workplace diversity? *Journal of Organizational Behavior*, *38*(2), 276–303. doi:10.1002/job.2040

Hannan, M., & Freeman, J. (1984). Structural inertia and organizational change. *American Sociology Review*, *49*(2), 149–164. doi:10.2307/2095567

Harrison, D. A., & Klein, K. J. (2007). What's the difference? Diversity constructs as separation variety or disparity in organizations. *Academy of Management Review*, *32*(4), 1199–1229. doi:10.5465/amr.2007.26586096

Hofstede, G. H. (1980). *Culture consequences: International differences in work – related values*. Thousand Oaks, CA: Sage.

Horwitz, S. K., & Horwitz, I. B. (2007). The effects of team diversity on team outcomes: A meta-analytic review of team demography. *Journal of Management*, *33*(6), 987–1015. doi:10.1177/0149206307308587

Hülsheger, U. R., Anderson, N., & Salgado, J. F. (2009). Team-level predictors of innovation at work: A comprehensive meta-analysis spanning three decades of research. *Journal of Applied Psychology*, *945*, 1128–1145. doi:10.1037/a0015978

Jackson, S. E., Joshi, A., & Erhardt, N. L. (2003). Recent research on team and organizational diversity: SWOT analysis and implications. *Journal of Management*, *29*(6), 801–830. doi:10.1016/S0149-2063_03_00080-1

Joshi, A., & Roh, H. (2009). The role of context in work team diversity research: A meta-analytic review. *Academy of Management Journal*, *52*(3), 599–627. doi:10.5465/amj.2009.41331491

Julian, S. D., & Ofori-Dankwa, J. C. (2017). Context matters: Diversity's short- and long-term effects in Fortune's "Best companies to work for." *Strategic Management Journal*, *38*(7), 1557–1565. doi:10.1002/smj.2576

Kearney, E., & Gebert, D. (2009). Managing diversity and enhancing team outcomes: The promise of transformational leadership. *Journal of Applied Psychology*, *94*(1), 77–89.

Keck, S. (1997). Top management team structure: Differential effects by environmental context. *Organization Science*, *8*(2), 143–156. doi:10.1287/orsc.8.2.143

Kee, T. S. (2008). Influences of confucianism on Korean corporate culture. *Asian Profile*, *36*, 1–15.

Kunze, F., Boehm, S. A., & Bruch, H. (2011). Age diversity, age discrimination climate and performance consequences-a cross organizational study. *Journal of Organizational Behavior*, *32*(2), 264–290. doi:10.1002/job.698

Kunze, F., Boehm, S. A., & Bruch, H. (2013). Organizational performance consequences of age diversity: Inspecting the role of diversity-friendly HR policies and top managers' negative age stereotypes. *Journal of Management Studies*, *50*(3), 413–442. doi:10.1111/joms.12016

Lam, A. (2005). Organizational innovation. In J. Fagerberg, D. C. Mowery, & R. R. L. R. Nelson (Eds.), *The Oxford hand book of innovation.* New York, NY: Oxford University Press.

Lovelace, K., Shapiro, D. L., & Weingart, L. R. (2001). Maximizing cross-functional new product teams innovativeness and constraint adherence: A conflict communications perspective. *Academy of Management Journal*, *44*, 779–793. doi:10.2307/3069415

McKay, P. F., & Avery, D. R. (2015). Diversity climate in organizations: Current wisdom and domains of uncertainty. In M. R. Buckley, A. R. Wheeler, & J. R. B. Halbesleben (Eds.), *Research in personnel and human resources management* (pp. 191–233). Bingley, UK: Emerald Group Publishing Limited.

Mintzberg, H. (1979). *The structuring of organizations.* Englewood Cliffs, NJ: Prentice-Hall.

Mueller, J. H., Schuessler, H. L., & Costner, H. L. (1970). *Statistical reasoning in sociology*. Boston, MA: Houghton Mifflin.

Mundy, L. (2017). *Why is silicon valley so awful to women?* The Atlantic, April.

Phillips, K. W., & Loyd, D. L. (2006). When surface and deep-level diversity collide: The effects of dissenting group members. *Organizational Behavior and Human Decision Processes*, *99*(2), 143–160. doi:10.1016/j.obhdp.2005.12.001

Ray, G., Barney, J. B., & Muhanna, W. A. (2004). Capabilities, business processes, and competitive advantage. *Strategic Management Journal*, *25*(1), 23–37. doi:10.1002/smj.366

Richard, O. C., Murthi, B. P. S., & Ismail, K. (2007). The impact of racial diversity on intermediate and long-term performance: The moderating role of environmental context. *Strategic Management Journal*, *28*(12), 1213–1233. doi:10.1002/smj.633

Rindova, V. P., & Fombrun, C. J. (2001). Entrepreneurial action in the creation of the specialty coffee niche. In C. B. Schoonhoven & E. Romanelli (Eds.), *The entrepreneurship dynamic: Origins of entrepreneurship and the evolution of industries*. Stanford, CA: Stanford.

Solis, H. L., & Hall, K. (2011). *Women in the labor force: A data book*. Washington, DC: US Bureau of Labor Statistics.

Stock, G. N., Greis, N. P., & Fischer, W. A. (2002). Firm size and dynamic technological innovation. *Technovation*, *22*(9), 537–549.

Sung, S. Y., & Choi, J. N. (2012). Effects of team knowledge management on the creativity and financial performance of organizational teams. *Organizational Behavior and Human Decision Processes*, *118*(1), 4–13. doi:10.1016/j.obhdp.2012.01.001

Swann, W. B., Polzer, J. T., Seyle, D. C., & Ko, S. J. (2004). Finding value in diversity: Verification of personal and social self-views in diverse groups. *The Academy of Management Review*, *29*(1), 9–27. doi:10.2307/20159006

Talke, K., Salomo, S., & Rost, K. (2010). How top management team diversity affects innovativeness and performance via the strategic choice to focus on innovation fields. *Research Policy*, *39*(7), 907–918. doi:10.1016/j.respol.2010.04.001

Van de Ven, A. H., & Poole, M. S. (1995). Explaining development and change in organizations. *Academy of Management Review*, *20*(3), 510–540. doi:10.5465/amr.1995.9508080329

Van der Vegt, G. S., Van de Vliert, E., & Huang, X. (2005). Location-level links between diversity and innovative climate depend on national power distance. *Academy of Management Journal*, *48*(6), 1171–1182. doi:10.5465/amj.2005.19573116

Van Knippenberg, D., De Dreu, C. K. W., & Homan, A. C. (2004). Work group diversity and group performance: An integrative model and research agenda. *Journal of Applied Psychology*, *89*(6), 1008–1022. doi:10.1037/0021-9010.89.6.1008

Wegge, J., Roth, C., Neubach, B., Schmidt, K. H., & Kanfer, R. (2008). Age and gender diversity as determinants of performance and health in a public organization: The role of task complexity and group size. *Journal of Applied Psychology*, *936*, 1301–1313. doi:10.1037/a0012680