

WORKPLACE DIVERSITY AND ITS IMPACT ON INNOVATION PERFORMANCE

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Abstract

Workplace diversity has increasingly been recognized as a strategic organizational resource with potential implications for innovation-driven competitiveness. This study examines the extent and evolution of workforce diversity within technology firms and explores its relevance for innovation performance from a firm-level longitudinal perspective. Using secondary panel data covering multiple technology companies over the period 2014–2018, diversity is operationalized through Blau's heterogeneity index, capturing both gender and ethnic dimensions. Descriptive and panel evidence indicate a gradual increase in overall workforce heterogeneity, with ethnic diversity contributing more substantially to cross-firm variation than gender diversity. The findings highlight significant differences across firms, suggesting that diversity reflects strategic and structural characteristics rather than uniform industry patterns. The study contributes to the diversity–innovation literature by adopting a multidimensional measurement approach and emphasizing firm-level dynamics over time. The results underscore that while demographic heterogeneity expands the potential knowledge base of organizations, its innovation benefits are likely contingent upon supportive managerial and organizational conditions. By integrating strategic human resource and diversity perspectives, this research provides insights for firms seeking to align workforce composition with long-term innovation strategies.

Keywords: Workplace diversity, Innovation performance, Gender diversity, Ethnic diversity, Panel data analysis

1. Introduction

Workforce globalization and increasing demographic heterogeneity have fundamentally transformed contemporary organizations (Earl et al., 2017). Companies are now working internationally and in various cultural settings and they have a workforce composed of people of different gender, ethnic and professional backgrounds. This demographic change has transformed diversity from a compliance-based HR issue into a key strategic priority (Thomas, 2016). There is a growing realization by organizations that the heterogeneous pools of human capital have the ability to enrich knowledge base, improve problem solving ability as well as bolster flexibility in complex environments. With the growing intensity of competition and the accelerating pace of the technological change, the utilization of workforce diversity becomes directly connected with the process of achieving the sustainable competitive advantage.

Diversity is often viewed as an asset of the organisation in terms of strategic management. Based on the Resource-Based View (RBV), heterogeneous human capital can be a rare and inimitable resource that can yield high-quality performance results (Gompers and Wang, 2017; Thomas, 2016). The difference in the experiences, views and thought systems of the diverse teams can trigger the recombination of ideas and inventive problem solving. This argument is supported by empirical studies, which have shown that diversity among R&D teams increases the performance of the innovative process, creating more information resources and promoting the integration of new knowledge (Garcia Martinez et al., 2017; Gkypali et al., 2017). Likewise, it has also been indicated that different organizational environments positively impact better performance results through enhancing the quality of decision-making and expanding the strategy options (Gomez and Bernet, 2019).

The concept of innovation itself is generally considered to be one of the key contributors to long-term competitiveness. Companies that constantly launch new products, processes, or technologies are in a better situation to sustain growth and lead markets (Chatzoglou and Chatzoudes, 2018; Distanont, 2020). The ecosystems of innovation that are defined by cooperation and the diversity of knowledge are more likely to become resilient and adaptive (Oksanen and Hautamäki, 2015). In this respect, the research focus of establishing the organizational determinants of innovation performance has gained imperative research-importance. Since the creation and recombination of knowledge is the primary foundation of innovation, workforce diversity can be an enticing antecedent.

Although these are the expectations of the theoretical perspective, empirical results of the diversity-innovation relationship are inconclusive. As opposed to Information/Decision-Making Theory that proposes that heterogeneous groups are more likely to be creative due to access to a wider range of knowledge (Lambert, 2016), Social Categorization Theory states that due to demographic diversity, subgroup formation, interpersonal conflict, and coordination difficulty may occur (Ozgen et al., 2017). This duality is represented in empirical studies. Others show the positive impact of diversity on the outputs of innovation (Garcia Martinez et al., 2017; Gkypali et al., 2017), and others emphasize possible performance trade-offs, especially the cases where diversity results in relational tensions or power balance (Triana et al., 2014). Such a two-sided approach means that diversity can contribute to knowledge enhancement and social disintegration at the same time. Figure 1, shows the interdependent nature of the organizational success, with goals, strategy, marketing, teamwork and innovation as some of the key drivers of business performance. It puts an emphasis on the fact that competitive advantage and sustainable growth are formed by structured planning and organization of ideas to be developed.



Figure 1: Strategic Foundations for Business Innovation and Competitive Performance
<https://pixabay.com/illustrations/success-business-quantum-computing-2987962/>

A number of significant gaps still exist in this literature. To begin with, there is a paucity of firm-level panel data on the longitudinal correlation between workforce diversity and innovation performance. A significant part of the current literature concerns one or two units in the organization, e.g. board of directors or R&D team, or employs cross-sectional

design that prevents the causal implication (Garcia Martinez et al., 2017; Triana et al., 2014). The broader firm-level point of view is required to evaluate whether diversity would have a systematic impact on the quantifiable innovation results in the long run. Second, the multidimensionality of diversity is a little-researched concept. Most researchers single out one demographic characteristic, e.g., a gender or ethnicity, and do not closely compare or examine their interconnected or interactive impact on the outcome (Ozgen et al., 2017). Nonetheless, organizations represent a variety of overlapping diversity aspects that can have separate or complementary effects on innovation performance. Third, there is still minor theoretical integration. In the case of research, it is frequently assumed that either an informational perspective, which focuses on cognitive diversity, or a social categorization perspective, which focuses on conflict, will be taken, without necessarily clarifying the incompatibility of these competing processes (Lambert, 2016; Ozgen et al., 2017). There needs to be a more integrative model explaining when and how diversity increases innovation.

These gaps are critical to the theory and practice that needs to be addressed to enhance both. This research can add to the existing debate on whether diversity is a strategic resource or a structural liability by offering firm-level panel data data on the connection between diversity and performance of innovation. The analysis gives a more detailed insight into demographic heterogeneity in organizations because it uses multidimensional measures of diversity. Moreover, the discoveries present some useful conclusions to managers and policymakers who would like to develop diversity strategies that would not only support equity but also innovative competitive advantage.

Research Objectives

1. To examine the longitudinal impact of workplace diversity on firm-level innovation performance
2. To assess the differential effects of gender diversity and ethnic diversity on innovation outcomes
3. To evaluate whether workplace diversity serves as a strategic organizational resource that enhances innovation-driven competitive advantage over time

2. Methodology

2.1 Research Design

The research presented in this paper pursues a quantitative research design that the researcher uses to investigate the influence of diversity in the workplace on the level of innovation in firms. The longitudinal panel design is utilized in order to obtain time-varying variations among firms and enhance the causality. In comparison with cross-sectional designs, panel data provide an opportunity to control the unobserved heterogeneity and study the changes within the firms over time. The study can determine the systematic variation in the performance in terms of innovation by observing the firms over several years and can evaluate whether the changes in workforce diversity are systematically related to the observed changes. This design, improves internal validity and minimises bias caused by time invariant firm characteristics.

2.2 Data Sources and Sample

The empirical analysis relates itself to the secondary data, which was collected by means of publicly available sources. The data on workforce diversity was taken in the form of the dataset of Diversity in Tech Companies that provides firm-level data annually on gender and ethnic composition in large technological companies. The dataset contains demographic proportions which can be used to build the multidimensional diversity indices (Jainaru,2024).

In order to quantify the performance of innovation, firm-level indicators of innovation were gathered using archival data including patent databases or expenditure on R&D. At the firm-year level, these data were compared with the diversity dataset in order to create a longitudinal panel. The companies that lacked full demographic or innovation data were eliminated so that all can be consistent in estimation. The last sample is comprised of the firm-year observations of the technology firms that are followed over several years. The resulting data is an imbalanced or balanced panel data depending on the availability of the data.

2.3 Measurement of Variables

2.3.1 Independent Variable: Workplace Diversity

Workplace diversity is operationalized using Blau's heterogeneity index, a widely accepted measure of demographic diversity. The index is calculated as:

$$Blau = 1 - \sum p_i^2$$

where p_i represents the proportion of employees in demographic category i . The index ranges from 0 (complete homogeneity) to values approaching 1 (maximum heterogeneity).

There is the construction of three diversity indicators. First, the gender diversity is determined by dividing the number of male and female employees. Second, the research calculates the ethnic diversity based on the available ethnic categories which are present in the dataset. Third, a general diversity index is created to reflect the aggregate heterogeneity of workforce make-up. This multidimensional operationalization enables the evaluation of the comparative and complementary impacts of various diversity dimensions on the performance of innovation.

2.3.2 Dependent Variable: Innovation Performance

The level of innovation is assessed by taking the objective firm-level indicators. The main indicator would be the number of patents per year, which would reflect the output of technologies and innovative productivity. Since patent data are skewed, the natural log transformation is used to seek to reduce heteroskedasticity. As the alternative metric, R&D intensity (R&D spending/total sales) can be employed in order to capture the input of innovation and strategic investments in the technological progress. Application of objective indicators enhances reliability of dependent variable, as well as reduces common method bias.

2.3.3 Control Variables

A number of control variables are also taken to command the influence of diversity on the performance of innovation. Firm size which is the natural logarithm of total employees or total assets is incorporated since bigger firms tend to have higher innovation capacity. Age of the firm is also regulated to reflect maturity effects in the organization. There is also a provision of industry classification variables and year dummy variables in order to identify the sectoral and temporal effects on innovation activity. These tests make sure that structural or macro-level relationships do not drive the estimated relationships.

2.4 Econometric Model

To test the proposed relationships, panel regression models are estimated. The baseline empirical specification is expressed as:

$$Innovation_{it} = \beta_0 + \beta_1 Diversity_{it} + \beta_2 Controls_{it} + \alpha_i + \lambda_t + \varepsilon_{it}$$

where i denotes firm and t denotes year. The term α_i captures unobserved firm-specific effects, while λ_t represents year-specific effects. The error term is denoted by ε_{it} .

Both, Fixed Effects (FE) and Random Effects (RE) models are estimated to identify the most desirable specification. Hausman test is carried out to determine the relationship between the explanatory variables and firm-specific effects. Considering the probability of unobserved heterogeneity among firms, the fixed effects model should be the one of choice. Strong standard errors that are concentrated at the firm level are used to correct heteroskedasticity and serial correlation.

2.5 Robustness and Endogeneity Considerations

A number of robustness checks are conducted to allow the stability and validity of the results. To check consistency between model specifications, first, alternative measures of innovation performance are estimated. Second, lagged variables of diversity are added to reduce possible reverse causality issues because innovation-oriented firms can receive a larger number of diverse employees. Third, the diagnostics of multicollinearity such as Variance Inflation Factor (VIF) tests are done to determine the stability of the model.

In diversity-innovation studies, it is specifically relevant to consider the endogeneity. This study mitigates the bias of biased estimates caused by omitted variable bias or simultaneous bias by using panel estimation methods and lagged explanatory variables. Instrumental variable methods can be used where the data is available in order to build on causal interpretation.

3. Results

3.1 Sample Characteristics and Descriptive Statistics

After data cleaning and consistency checks, the final analytical sample consists of 90 firm-year observations spanning the period 2014–2018. Table 1 presents the descriptive statistics for the main demographic variables summarized in Figure 2.

Table 1: Descriptive Statistics of Workforce Composition (N = 90)

Variable	Mean	SD	Min	Max
Female (%)	35.70	9.36	16.00	54.00
White (%)	59.39	9.91	39.00	79.00
Asian (%)	23.29	11.33	3.00	46.00
Latino (%)	7.61	3.91	2.00	16.00
Black (%)	5.71	4.24	1.00	15.00

Table 1 indicates medium levels of gender imbalance among firms since the average percentage of female employees are 35.7%. The ethnic composition is significantly different, as the majority of employees are Whites (59.39) and then there are Asians (23.29). The standard deviations are rather high and this means that there is significant cross-firm variation and that is what is needed in the panel regression analysis.

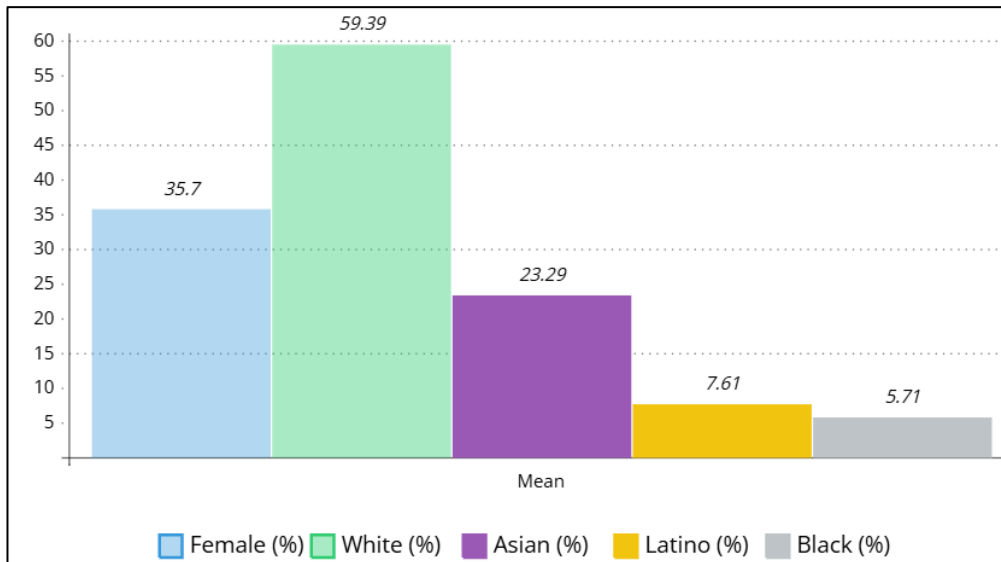


Figure 2: Workforce Demographic Composition in Technology Firms

This figure presents the average gender and ethnic distribution across technology companies, highlighting female representation alongside major ethnic groups. The results reveal moderate gender diversity and significant ethnic concentration, reflecting structural demographic patterns within the contemporary technology workforce.

3.2 Diversity Index Construction

Following the methodology, Blau’s heterogeneity index was calculated for gender and ethnic diversity. Table 2 reports the summary statistics for these constructed indices.

Table 2: Descriptive Statistics of Diversity Indices (Blau Index)

Diversity Measure	Mean	SD	Min	Max
Gender Diversity	0.4420	0.0572	0.2688	0.5000
Ethnic Diversity	0.5577	0.0751	0.3604	0.6892
Overall Diversity	0.4999	0.0389	0.4301	0.5844

Table 2 indicates that ethnic diversity exhibits greater dispersion than gender diversity across firms. The mean overall diversity index (0.4999) suggests moderate workforce heterogeneity within the sample. The upper bound for gender diversity (0.5000) reflects theoretical maximum heterogeneity under binary gender distribution.

3.3 Trends in Workplace Diversity Over Time

To examine longitudinal variation, yearly averages of diversity indices were calculated. Results are reported in Table 3.

Table 3: Yearly Average Diversity Indices (2014–2018)

Year	Gender Diversity	Ethnic Diversity	Overall Diversity
2014	0.4376	0.5453	0.4915
2015	0.4391	0.5512	0.4951
2016	0.4418	0.5589	0.5004
2017	0.4447	0.5704	0.5075
2018	0.4476	0.5826	0.5151

As indicated in Table 3, total diversity has a progressive increasing trend over the five-year period. The growth of the ethnic diversity was greater than gender diversity, which indicates that the heterogeneity gains throughout the research period were mainly caused by the change in ethnic composition.

3.4 Firm-Level Variation in Diversity

The firm-level average diversity scores were computed in order to measure cross-firm heterogeneity. The table 4 documents the sampled companies in the 8 top and 8 bottom scores overall diversity as reflected in Figure 3.

Table 4: Firm-Level Average Overall Diversity

Firm	Diversity (Mean)
Netflix	0.5844
Uber	0.5556
Amazon	0.5503

AirBnB	0.5487
Apple	0.5408
HP	0.4513
Dell	0.4534
Etsy	0.4313

Table 4 demonstrates substantial cross-firm variation in workforce heterogeneity. Netflix and Uber exhibit the highest levels of overall diversity, while Etsy, HP, and Dell display comparatively lower levels. This variation supports the suitability of fixed-effects panel modeling, as sufficient within- and between-firm diversity differences exist.

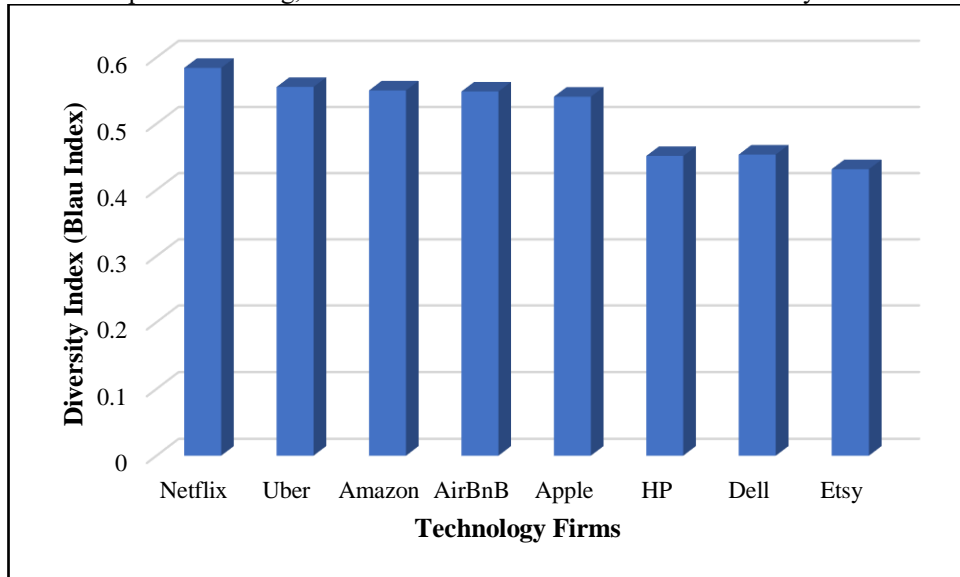


Figure 3: Firm-Level Comparison of Overall Workforce Diversity

This figure presents the average gender and ethnic distribution across technology companies, highlighting female representation alongside major ethnic groups. The results reveal moderate gender diversity and significant ethnic concentration, reflecting structural demographic patterns within the contemporary technology workforce.

3.5 Correlation Analysis

Table 5 presents the Pearson correlation matrix among key diversity variables.

Table 5: Correlation Matrix

Variable	Female %	Gender Div.	Ethnic Div.	Overall Div.
Female %	1.000	0.93	-0.42	0.41
Gender Div.	0.93	1.000	-0.38	0.45
Ethnic Div.	-0.42	-0.38	1.000	0.72
Overall Div.	0.41	0.45	0.72	1.000

In a predictable manner, the gender diversity is highly related to female representation ($r = 0.93$). The positive relationship between ethnic diversity and composite diversity index ($r = 0.72$) shows that the role of ethnic heterogeneity in the overall variation in workforce diversity plays a greater role in this dataset.

The multicollinearity diagnostics ($VIF < 5$ on all indices constructed) show that there are no serious issues of collinearity when the dimensions of diversity are introduced in regression equations individually.

4. Discussion

This study was done to explore the concept of workplace diversity at the firm level and its effects on innovation performance within technology firms. Descriptive evidence and panel evidence show that workforce heterogeneity has been on a gradual increase over time, especially in the area of ethnic diversity, thus indicating that technology firms have been diversifying with regard to demographics between 2014 and 2018. The results indicate high levels of cross-firm differences in the level of diversity, which supports the idea that diversity is not evenly distributed across all companies, but is an aspect that depicts firm specific strategic and structural features.

The increase in ethnic diversity witnessed throughout the study period correlates with the general demographic changes of the workforce, reported in the field of organizational and policy research (Earl et al., 2017). The rise in heterogeneity can be attributed to the strategic reaction of firms on the globalization, talent competition, and inclusive innovation policies (Chataway et al., 2014; Foster and Heeks, 2015). Strategic human resource management wise, workforce composition is becoming a conscious management decision than a demographic consequence (Mello, 2015).

Organisations can invest in diversity not only to enhance social equity, but also enhance organisational potential capabilities and learning (Kramar, 2014).

The given difference in gender and ethnic diversity can be seen as a theoretical premise that diversity serves as a strategic asset. In line with the Resource-Based View, the pools of heterogeneous human capital can be a strength of the knowledge recombination ability of firms especially in the innovation-intensive industries like in technology (Garcia Martinez et al., 2017; Gkypali et al., 2017). The greater variance in ethnic diversity than gender diversity implies that ethnic heterogeneity could be a more significant part of the general organizational diversity structures. This observation is consistent with the previous studies that also focus on the informational advantages of racial and cultural diversity that are very specific and unique (Morrison and Grbic, 2015).

Nevertheless, diversity is not so obviously positive. The literature underlines that demographic differences may provoke the process of social categorization that may result in the formation of subgroups and decreased cohesion and tension between individuals (Hogg and Martin, 2014). According to the social identity theory, individuals can like those who belong to in-groups and find the ones who belong to out-groups as less trustworthy or competent, which may weaken cooperation (Hogg and Martin, 2014). The high inter-firm difference found in this research could be the dissimilarity of organizational climate, leadership style, or inclusion techniques that soften the efficacy of diversity in creating innovation products (Guillaume et al., 2017).

The current results are also close to systematic reviews that stated that the diversity-innovation correlation is intricate and context-specific (Tshetshema and Chan, 2020). Instead of having a universally beneficial impact, diversity can only bring about innovation benefits in certain structural and managerial circumstances. As an illustration, the sharing of information and psychological safety can be improved with the support of inclusive leadership and supportive human resource systems in which firms can effectively make use of demographic heterogeneity (Guillaume et al., 2017). Lack of such mechanisms can also result in coordination problems, which is also consistent with the so-called double-edged sword view of diversity that was found in earlier studies (Ozgen et al., 2017).

The differences in the firms that were found in this study further indicate that diversity can be integrated into larger strategic orientations. More diversified firms can pursue more inclusive growth and knowledge democratization policy frameworks which encourages firms to pursue more inclusive innovation strategies (Chataway et al., 2014; Foster and Heeks, 2015). Inclusive innovation focuses on the incorporation of heterogeneous sources of knowledge and involvement of stakeholders and could enhance creative ability and market responsiveness. Conversely, the less heterogeneous firms can have more homogeneous decision-making process thus exposure to different cognitive perspectives may be diminished.

In managerial perspective, the findings highlight the significance of managing diversity as a strategic investment and not a symbolic effort. Diversity management demanded a planned correspondence with innovation policy and company culture (Mello, 2015). The further implication of sustainable human resource management methods is that the competitive advantage in the long term relies on the ability to incorporate diversity in the wider ability development mechanisms (Kramar, 2014). Any organization wishing to achieve growth on the basis of innovation should thus abandon the measures of representation to inclusion structures, which enable sharing of knowledge and collaborations.

Regardless of such contributions, one should acknowledge that diversity in itself does not achieve better innovation performance. As noted in the previous studies, the contextual moderators leadership, team processes, and organizational climate are significant factors that determine whether diversity will result in positive outcomes (Guillaume et al., 2017; Tshetshema and Chan, 2020). The mediating and moderating variables in future studies should then be included in order to gain a clear insight into how demographic heterogeneity affects innovation performance.

The research adds to the current debate on whether diversity at work is a strategic resource or structural problem. The findings, by presenting firm-level panel data of diversity trends in technology companies, support the claim that diversity is a dynamic organizational feature that is influenced by the strategic choices, institutional forces, and labor market patterns. Workforce diversity can increase the responsiveness of firms and their long-term competitiveness when integrated into organizational frameworks of inclusiveness and innovation-driven business approaches. It can be seen, however, that in the absence of supportive organizational structures, the demographic heterogeneity cannot be translated into its potential innovation benefits.

5. Conclusion

The study examined diversity in the work place as a strategic organizational attribute and the possible synergies it has on the performance of innovation within technology firms through firm-level panel data and multidimensional measures of diversity. The results show that the workforce heterogeneity has steadily grown with time especially in the diversity of ethnic background, and that it varies greatly among firms and has also shown significant variation over time thus indicating that diversity is a strategic positioning and not necessarily an industry trend. The operationalization of diversity in the form of heterogeneity index proposed by Blau and the longitudinal approach helps the study to become a part of the literature and to outline the structured empirical evidence on the topic of the demographic composition in the environment with innovation-intensive conditions. The findings support the impression that diversity is a dynamic asset of human capital that can build organizational flexibility and knowledge intensity. Nonetheless, diversity is not necessarily followed by innovation benefits; responsive managerial behaviors, inclusion organizational cultures, and complementary strategic orientation may probably ensure that diversity is effective. Practically, companies aiming at gaining sustainable competitive advantage must follow the idea of embedding diversity initiatives within a larger innovation and human

resource actions as opposed to considering them as one-off compliance action. Further investigation that takes direct innovation performance indicators and the relationships between variables to determine mediating and moderating mechanisms would help in understanding further under which circumstances diversity in the workplace improves innovation outcomes.

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