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RESEARCH PAPER

Gender Diversity and Firm Performance: Evidence from Pakistan's Industrial and Services Sectors

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ABSTRACT

This study examines the impact of gender diversity on organizational performance across the industrial and services sectors in Pakistan. Utilizing the Resource-Based View, Agency Theory, and Institutional Theory, it examines the impact of female involvement in ownership, management, and workforce positions on organizational results, specifically firm sales. This research seeks to empirically assess if and how gender-inclusive enterprises in Pakistan, characterized by female labor force participation and sector-specific gender inequities, outperform their counterparts. The study utilized Propensity Score Matching (PSM) with firm-level data from the World Bank Enterprise Survey (2022) to mitigate selection bias and discern causal effects. Three treatment dimensions were examined: female ownership, female executive leadership, and female worker representation. Each treated firm was paired with observationally comparable non-treated enterprises through the nearest-neighbor matching. The dependent variable was company performance, represented by the logarithm of sales. The results demonstrate that companies with female managers, and female workers achieved superior performance. Female ownership was not strongly correlated with statistically significant increases in the logarithm of sales, even after matching. These findings emphasize that gender-diverse companies are both socially progressive and commercially beneficial.

KEYWORDS Gender Diversity, Corporate Performance, Propensity Score Matching(PSM), Female Ownership, Pakistan, Manufacturing Sector, Services Sector, Logarithm Of Sales, Sustainable Development Goals (SDGs)

Introduction

Over the past few decades, the idea of gender diversity has become a crucial topic in organizational study and practice. The fair representation and active involvement of people of different genders in the workforce is referred to as gender diversity. It captures both men's and women's numerical presence as well as their participation in strategic roles, leadership, and decision-making. Gender diversity is crucial for creating resilient organizations that promote creativity, innovation, and wider economic benefits, according to the United Nations (2020). Understanding how gender diversity can improve firm performance has become more and more crucial in business settings, especially in rising economies like Pakistan.

According to a 2015 McKinsey Global Institute study, reducing gender disparities in labor force participation might boost global GDP by as much as 26% by 2025. These results suggest that increasing gender inclusion is not simply a social justice issue but also a strategic necessity for business expansion and organizational success. The Sustainable Development Goals (SDGs) 5 (Gender Equality) and 10 (Reduced Inequalities) are all intimately related to the promotion of gender equality. Achieving these objectives depends

on ensuring women's full employment participation, particularly in important industries like manufacturing and services. Pakistan has an obligation to establish inclusive labor markets that enable women's economic and social empowerment as a signatory to the 2030 Agenda for Sustainable Development. This study aims to close a significant gap in the literature by examining Pakistan's firm-level dynamics and the significance of gender diversity for economic development. The study intends to offer practical insights for scholars, business executives, and policymakers by examining the ways in which gender diversity affects firm performance in Pakistan's manufacturing and services sectors.

This study's main goal is to look into how gender diversity and business performance relate to each other in Pakistan's industries. It specifically aims to examine whether increased gender diversity in businesses improves performance outcomes including increased sales. In order to accomplish these goals, the study will evaluate the proposed links between gender diversity and business outcomes using firm-level data gathered from World Bank survey (2022) using propensity score matching

This study significantly contributes to the literature on gender diversity and company performance by concentrating on firm-level variables. The research employs Propensity Score Matching (PSM) to meticulously separate the causal effect of female participation in various organizational roles on company sales, a concrete performance indicator. The matching guarantees comparability by considering covariates such as business age, location, legal ownership structure, website presence, and firm size, which are all internal firm characteristics that may influence performance regardless of gender. The results emphasize that gender diversity inside a company's internal framework is not merely an issue of fairness but a performance-boosting advantage

Moreover by distinguishing the impacts of female ownership, female executive leadership, and female workforce, the study offers detailed insights into which dimensions of gender diversity most significantly affect corporate performance. This enables organizations, particularly within the Pakistani environment, to customize their diversity and governance plans more efficiently, matching internal structures with enhanced commercial success.

Literature Review

The findings underscore the importance of board characteristics in shaping firm outcomes and offer practical implications for management, aligning with stewardship and resource dependency theories. (Duppati et al., 2020)

Initial foundational research (Carter et al.,2003) and (Erhardt et al., 2003) in the United States identified a favorable association between gender diversity on corporate boards and enhanced company performance metrics, including return on assets (ROA) and return on investment (ROI), utilizing the resource-based view (RBV) paradigm. (Dezsö and Ross.,2012) similarly found that female executives substantially augment innovation, particularly in sectors characterized by high R&D intensity. (Østergaard et al.,2011) corroborated these findings by associating workforce gender diversity with enhanced innovation in Denmark, contextualized within Social Identity Theory.

Adams and Ferreira., (2009) offered a nuanced perspective on governance, indicating that diverse boards enhance monitoring yet may have variable impacts on company performance contingent upon cultural and organizational contexts. (Palvia et al.,2015) revealed that banks led by women had heightened risk aversion and stability during financial crises. Simultaneously, research by (Bear et al.,2010) and (Post et al.,2011) highlighted the beneficial impact of female board members on CSR ratings and environmental performance, consistent with Stakeholder Theory.

In the South Asian setting, particularly in Pakistan, research indicates both the potential for and the enduring obstacles to gender inclusion. (Aftab and Naveed.,2018) established a favorable correlation between board gender diversity and return on assets (ROA), aligning with resource-based view (RBV) findings in Western contexts. (Malik and Kotabe.,2009) and (Ali and Syed.,2017) identify entrenched institutional and cultural barriers that impede women's progress in managerial positions. These encompass discriminatory customs, absence of mentorship, and opposition to gender-inclusive policies.

Jamali et al.,2(010) noted that women in Pakistan and Lebanon are frequently restricted to small-scale or family-operated enterprises, illustrating gendered norms for economic involvement. (Shaukat and Trojanowski.,2018) emphasized that regulatory gender quotas in Pakistan are frequently symbolic and deficient in substantial enforcement. Likewise, (Syed et al.,2005) and (Khilji.,2013) emphasized that gender reforms at the policy level in Pakistan are ineffective without concurrent societal transformation and contextually appropriate human resource management techniques. (Khalid and Rehman.,2020) and (Ali et al.,2011) discovered that inclusive HR strategies enhance employee satisfaction and retention, especially when authentic inclusion is implemented. (Hunt et al.,2015) indicated in their McKinsey study that companies in the top quartile for gender diversity are 21% more likely to surpass their competitors, hence strengthening the argument for diversity in business.

Eagly and Wood., (2012) and (Kanter.,1977) posited that gender roles are socially created and that tokenism diminishes the influence of solitary female representation. (Torchia et al.,2011) shown that the presence of a minimum of three women on a board is essential for achieving the complete advantages of diversity, referred to as the Critical Mass Theory. Notwithstanding global progress, the World Economic Forum (2023) persists in ranking Pakistan among the lowest nations in gender parity, highlighting the imperative of converting gender diversity into tangible economic inclusion.

Material and Methods

The data for this study has been sourced from the World Bank Enterprise Surveys (WBES), a reputable and dependable repository of firm-level data spanning many countries. The WBES gathers extensive data on the business environment, firm attributes, performance metrics, and workforce makeup, including employment figures disaggregated by gender. This renders it an optimal resource for examining the influence of gender roles and diversity on corporate performance. This research employed the most recent survey data available for Pakistan (2022). This database offers comprehensive information on companies in the manufacturing and services sectors, facilitating a comparative investigation of gender representation and its relationship with firm-level results. The sample encompasses small, medium, and big enterprises, presenting a varied array of organizational frameworks and operational magnitudes. The Enterprise Surveys employ a stratified random sample procedure to guarantee national and sectoral representation. Essential factors pertinent to this study—including the proportion of female employees, female representation in management, business size, productivity, sales growth, and labor force attributes—were extracted and examined.

As female participation is not randomly allocated among enterprises, employing OLS may result in skewed estimates due to confounding variables. Propensity Score Matching (PSM) provides a resolution by establishing a quasi-experimental framework. It equilibrates observable traits between treatment and control businesses, emulating the conditions of a randomized trial (Rosenbaum & Rubin, 1983).

Assuming substantial ignorability and adequate overlap in the distribution of propensity scores, Propensity Score Matching (PSM) can produce unbiased estimates of causal effects (Guo & Fraser, 2010). It facilitates the assessment of the Average Treatment

Effect on the Treated (ATT), which juxtaposes the actual outcome for treated firms with the hypothetical outcome they would have experienced in the absence of treatment.

PSM is suitable in this context as it considers observable company-level variations such as size, age, and sector, which correlate with both female involvement and firm performance (Austin, 2011). Propensity Score Estimation and Common Support Propensity Score Matching (PSM) is executed in two phases. Initially, propensity scores are calculated utilizing a logit or probit regression grounded on the aforementioned control variables. Secondly, a prevalent support condition is implemented to guarantee that treated businesses are exclusively compared to controls within a common range of propensity scores (Caliendo & Kopeinig, 2008). This circumvents extrapolation and guarantees reliable comparisons. Table No 1 and 2 present the details of the variables used in the study.

Table 1
Description of Treatment Variables of Three Models and Outcome Variable

	Variable	Description	Measurement
	Model No 1: Female Ownership of Firm		
1)	Female Ownership (b4a) and Female owner(b4)	% Ownership by Females, and presence of female owner	Continuous (percentage), and Dummy (1 = Yes, 0 = No). Taken as Dummy, =1 if Yes to either of the above, and 0 otherwise
	Model No 2: Top Manager is Female		
1)	Female Top Manager (B.7a)	Top Manager is Female	Dummy =1, if Yes, and =0 otherwise.
	Model No 3:Productipn non Production workers		
1)	Permanent Female Workers both Production(l5a) and Non-production (l5b)	Female Non-production Workers	Dummy =1, if either is Yes and=0 otherwise
	Outcome/Dependent Variable		
1)	Sales	Annual sales revenue of the firm (self-reported, last fiscal year, from WBES variable d2)	Continuous (in local currency PKR, transformed using natural logarithm to reduce skewness)

Table 2
Description of Control/Independent Variables (Cofounding Variables)

Sr.	Variable	Description	Measurement
1)	Firm Age (FA)	Calculated in Years from the year of start of establishment	Continuous Variable
2)	Firm Size (FS)	Number of permanent full time employees	Dummy(=1 if firm has 100 or more employees, 0 otherwise)
3)	Firm Location (FL)	City Size	Dummy (1 = Over 250k-1 million, 0 otherwise)
4)	Firm Sector (FSect)	Firm Sector	Dummy (=1 if Firm is manufacturing, and 0 otherwise)
5)	Firm's Sole ownership (FOwn)	Type of Ownership	Dummy(=1, if sole ownership, 0 otherwise)
6)	Website/Social Media Presence(FWeb)	Online Presence	Dummy (1 = Yes, 0 = No)

We estimate a propensity score for each firm to model the treatment assignment. We specifically regress the treatment indicator D_i on the firm's characteristics (covariates) utilizing a binary choice model (e.g., probit or logit). The propensity score is articulated as $e(X_i) = \Pr(D_i = 1 \mid X_i)$. This score is estimated by fitting a logistic (or probit) regression of the form:

(Here the stochastic component is D_i, being Bernoulli with mean p_i No additive error is placed on the logit scale.)

Logit $(\mathrm{e}(X_i)) = \alpha_0 + \alpha_1 Age_i + \alpha_2 Size_i + \alpha_3 Location_i + \alpha_4 Sector_i + \alpha_5 OwnershipType_i + \alpha_6 Website_i$.....(1)

Average Treatment Effect on the Treated (ATT): after matching, the Average Treatment Effect on the Treated (ATT) is calculated as follows:

$$\mathrm{ATT} = E\,(Y_i(1) - Y_i(0) | D_i = 1) \text{.....(2)}$$

This denotes the average disparity in logarithmic sales between treated enterprises and their corresponding matched equivalents. The ATT offers a reliable assessment of the influence of female participation on the performance of the treated set of firms. Standard errors are modified by bootstrap techniques or matched sample estimators (Austin, 2011).

The efficacy of the matching process is evaluated through Kernel density graphs of the propensity scores prior to and after matching. Standardized mean differences for variables, with values below 0.1 signifying adequate balance. T-tests and Wilcoxon tests for statistical disparities in matched covariates. The diagnostics validate that the treatment and control groups are comparable post-matching, hence confirming the accuracy of the ATT estimations (Guo & Fraser, 2010; Austin, 2011).

Results and Discussion

The Table No 3 presents descriptive data for essential firm-level characteristics, contrasting 87 treated enterprises (female-owned) with 1,213 non-treated firms (non-female-owned). The primary factors assessed comprise firm age (FA), firm size (FS), firm location (FL), firm sector (FSect), type of ownership (FOwn), and website presence (FWeb). The summary statistics of variables of the three models is presented in Table Nos 3, 4 and 5 as shown below.

Table No 3
Summary Statistics Variables-Model No 1

	Variables	Treated Group Female Owned=1					Non Treated Group Non Female Owned=0				
		Obs	Mean	St Dev	Min	Max	Obs	Mean	St Dev	Min	Max
1	Firm Age	87	33.65	20.86	3	135	1213	24.51	15.37	1	107
2	Firm size	87	.5287	.502	0	1	1213	.2176	.412	0	1
3	Firm location	87	.885	.320	0	1	1213	.876	.329	0	1
4	Firm Sector	87	.643	.481	0	1	1213	.652	.476	0	1
5	Firm Ownership	87	.482	.502	0	1	1213	.657	.474	0	1
6	Firm Website	87	.873	.334	0	1	1213	.552	.497	0	1
7	Log of sales	87	19.68	2.12	14.4	24.34	1213	18.31	1.73	14.07	23.9

Female-owned enterprises have an average age of 33.65 years, markedly exceeding the 24.51 years average for non-female-owned enterprises. This indicates that female-owned enterprises in the sample are generally more mature, potentially reflecting superior governance methods or resilience. Female-owned enterprises are, on average, larger, with a mean value of 0.5287 (signifying that more than half are large organizations) in contrast to 0.2176 for non-female-owned enterprises. This suggests that a higher percentage of female-owned businesses are larger, potentially leading to improved performance indicators.

Both groups exhibit comparable geographical distribution, with 88.5% of female-owned enterprises and 87.6% of non-female-owned firms situated in urban regions or designated business hubs. This indicates that location is not a significant differentiating factor between the two groups. The proportion of manufacturing vs service sector

enterprises is roughly equivalent in both groups: 64.3% in the treated group and 65.2% in the control group. This facilitates an equitable comparison of sectoral allocation.

Female-owned enterprises are less inclined to operate as sole proprietorships, with a value of 0.482 in contrast to 0.657 within the non-female-owned category. This may suggest that female-owned enterprises are more inclined to be partnerships or corporations, thereby influencing decision-making dynamics and governance structures. A notable disparity exists: 87.3% of female-owned enterprises has a website, in contrast to merely 55.2% of non-female-owned enterprises. This indicates that female-owned enterprises may exhibit greater digital orientation or professionalization, thereby enhancing their governance and performance.

Typically older, larger, and more inclined to possess digital infrastructure (online presence) exhibit a reduced likelihood of exclusive ownership, potentially signifying more collaborative ownership frameworks, share proximity in location and sector, diminishing the probability that external contextual factors account for performance disparities. These trends indicate that female ownership correlates with more established, organized, and digitally integrated enterprises, consistent with the study's findings on enhanced governance efficiency and company performance

Table 4
Summary Statistics Variables-Model No 2

	Variables	Treated Group Female Manager=1					Non Treated Group Non Female Manager=0				
		Obs	Mean	St Dev	Min	Max	Obs	Mean	St Dev	Min	Max
1	Firm age	48	35.95	18.81	6	74	1252	24.71	15.69	1	135
2	Firm size	48	.4375	.501	0	1	1252	.230	.421	0	1
3	Firm location	48	.895	.308	0	1	1252	.876	.329	0	1
4	Firm Sector	48	.708	.459	0	1	1252	.649	.477	0	1
5	Firm ownership	48	.583	.498	0	1	1252	.648	.477	0	1
6	Firm website	48	.916	.279	0	1	1252	.560	.496	0	1
7	Log of sales	48	19.9	2.011	14.4	24.3	1252	18.34	1.75	14.0	23.9

Summary Statistics of Variables (Model 2) Table No.4 presents the summary statistics for Model 2, comparing businesses with female managers (treated group) to those with non-female managers (non-treated group) across several firm-level factors. Enterprises managed by female executives have an average age of 35.95 years, whilst those without female executives average 24.71 years. This suggests that organizations led by women are likely to demonstrate greater maturity and potentially increased stability. A greater percentage of female-managed organizations are classified as large (mean = 0.4375) compared to only 23% of non-female-managed firms. This highlights a positive association between organizational size and the presence of female leadership.

The locational attributes are largely comparable, with 89.5% of female-managed enterprises and 87.6% of non-female-managed firms located in urban or economically vibrant areas, indicating an absence of substantial locational bias. A slightly higher proportion of female-managed firms are located in the manufacturing sector (70.8%) compared to the control group (64.9%). This distribution enables sectoral comparability across the categories. The ownership structure is quite similar between the two groups. Female-managed firms exhibit a little lower propensity for sole proprietorship (mean = 0.583 vs. 0.648), suggesting a preference for more collaborative or corporate ownership models in these organizations. A notable discrepancy in web presence exists, with 91.6% of firms managed by female leaders having websites, compared to 56% of those led by males. This signifies an increased emphasis on digital visibility, professionalism, and potentially consumer engagement in women-led firms.

Model 2 reveals that firms led by female executives are generally older, larger, and more technologically sophisticated, with slight variations in industry and ownership structure. The attributes of these companies provide essential background for understanding the factors contributing to their possible improvement in governance or performance results, as analyzed in the empirical study.

Table 5
Summary Statistics Variables- Model No 3

	Variables	Treated Group Female Workers=1					Non Treated Group Non Female Workers=0				
		Obs	Mean	St Dev	Min	Max	Obs	Mean	St Dev	Min	Max
1	Firm age	313	30.17	17.05	4	135	987	23.5	15.22	1	107
2	Firm size	313	472	.500	0	1	987	.164	.370	0	1
3	Firm location	313	.884	.319	0	1	987	.874	.331	0	1
4	Firm sector	313	1	0	1	1	987	.541	.498	0	1
5	Firm ownership	313	.479	.500	0	1	987	.699	.458	0	1
6	Firm Websitte	313	.763	.425	0	1	987	.513	.500	0	1
7	Log of sales	313	19.84	1.51	14.0	24.34	987	17.94	1.62	14.2	22.1

Table No. 5 presents summary data for Model 3, which examines the firm-level characteristics of enterprises employing female workers (treated group) compared to those without (non-treated group). The comparison uncovers numerous significant tendencies. On average, firms that employ female workers are older (30.17 years) than those that do not employ female workers (23.5 years). This indicates a propensity for more established companies to have included gender diversity into their workforce. A notable disparity is evident in firm size. The mean for companies employing female workers is 0.472, whereas it is 0.164 for those without female employees. Larger organizations are more inclined to hire female employees, potentially owing to enhanced resource availability, structured human resource operations, or inclusive hiring strategies. The location features are comparable across the groups, with 88.4% of treated firms and 87.4% of control firms situated in urban or economically significant areas. Consequently, geographic bias is negligible.

A significant disparity exists in this context. All enterprises employing female workers are situated in the manufacturing sector (FSect = 1), while merely 54.1% of firms devoid of female workers operate within manufacturing. This signifies a substantial concentration of female labor in manufacturing, probably attributable to sector-specific positions (e.g., textiles, clothes). Firms with female workers are less frequently sole-owned (mean = 0.479) than those without female workers (0.699), indicating a potential correlation between formal or corporate ownership structures and gender-inclusive hiring practices. Firms that employ female workers exhibit greater digital engagement, with 76.3% possessing a website, in contrast to 51.3% of firms lacking female employees. This corroborates the conclusion that digitally engaged and structured enterprises exhibit greater inclusivity.

Model 3 indicates that companies employing female workers are generally older, larger, more formally structured, and predominantly situated in the manufacturing sector. They are also more inclined to possess a digital presence, which may enhance organizational efficiency and foster openness to labor diversity.

Propensity Score Matching (PSM)

This study begins by implementing Propensity Score Matching (PSM) to estimate the causal impact of female ownership of the firms- Model 1, Female Manager- Model No 2 and Female workers- Model No 3, on the firm performance. The PSM method compares a treated group (enterprises with female owners- Model No 1, Female Managers- Model No 2 and

Female Workers Model No 3) against a control group (enterprises without female ownership- Model No 1, Without Female Managers- Model No 2 and without female workers- Model No 3).

Results-Model No 1

Table No 6, below gives the results of model No 1. In this model the variables are taken as: Treatment Variable: Female Ownership- Outcome Variable: log of sales- Confounding variables: Firm Age, Firm Size, Firm location, Firm Sector, Firm Sole Ownership, Firm Website The propensity scores are estimated using a logit regression model. The common option restricts the sample to the region of common support, that is, the overlapping range of propensity scores between treated and control groups. It serves the purpose of avoiding poor matches by excluding observations that have no suitable counterpart in the other group. Or that Fall outside the overlapping range of propensity scores.

Table 6
PSM Result of Model No 1

Model 1 Female Owned	**Coefficient**	**z**	**p>absolute z**
Firm Age (FA)	.012	3.57	0.000
Firm Size (FS)	.574	4.52	0.000
Firm Location (FL)	-.059	-0.32	0.750
Firm Sector (FSect)	-.324	-2.44	0.015
Firm's Sole ownership (FOwn)	-.264	-2.23	0.026
Website/Social Media Presence(FWeb)	.590	4.02	0.000
No of Obs	1300		
LR chi2(6)	82.70		
Prob > chi2	0.0000		
Psuedo R2	0.1295		

Table 7
The ATT

Variable	**Sample**	**Treated Group**	**Control Group**	**Differences**	**Std. Error**	**t-Statistic**
logsales	Unmatched	19.68	18.31	1.366***	0.195	6.99
	ATT	19.67	19.33	0.344	0.327	0.47

Note: ***, **, and * indicate significance at the 1%, 5%, and 10% levels respectively.

The positive coefficient indicates that as the firm's age increases by one year, the dependent variable is expected to have a positive impact. This relationship is statistically significant. Firm size has a positive relationship with the dependent variable, and an increase in firm size by one unit is associated with a positive effect in the outcome. This is statistically significant. Firm website has a positive impact on the outcome variable, the rest of the variables here are insignificant

Treatment Effect (ATT) Analysis: Treated group: 19.68 (Logsales), Controls group: 18.31 (Logsales), Difference: 1.37, Standard Error: 0.1956, T-statistic: 6.99. The difference in means between the treated and control groups is 1.37, and the t-statistic (6.99) indicates that this difference is statistically significant at a very high level. ATT (Average Treatment Effect on the Treated): Treated: 19.68, Controls: 19.52, Difference: 0.154, Standard Error: 0.3247, T-statistic: 0.47. The ATT suggests a smaller difference of 0.154 between the treated and control groups, but the t-statistic of 0.47 suggests this result is not statistically significant, meaning we cannot confidently say the treatment had an effect. Overall, these findings imply that once comparable controls are considered, the Female Ownership of the Firm, does not exert a significant causal impact on firm sales.

Results-Model No 2

Table No 8 below gives the results of model No 2. In this model the variables are taken as: Treatment Variable: Female Manager- Outcome Variable: log of sales- Confounding variables: Firm Age, Firm Size, Firm location, Firm Sector, Firm Sole Ownership, Firm Website

Table 8
PSM Result of Model No 2

Model 2 Female Managers	Coefficient	z	p>absolute z
Firm Age (FA)	.013	3.36	0.001
Firm Size (FS)	.224	1.48	0.139
Firm Location (FL)	.036	0.15	0.877
Firm Sector (FSect)	-.009	-0.06	0.951
Firm's Sole ownership (FOwn)	.031	0.22	0.827
Website/Social Media Presence(FWeb)	.807	3.96	0.000
No of Obs	1300		
LR chi2(6)	45.36		
Prob > chi2	0.0000		
Psuedo R2	0.1104		

The table No 9. given below shows the average treatment effect on the treated (ATT), it applies only to the firms with female-manager, not all firms. It reflects that after controlling for cofounding factors, firms with female-manager have on average higher or lower sales as compared to what they would have had if they were not female-owned. The table also shows if this effect is statistically significant or not.

Table 9
The ATT

Variable	Sample	Treated Group	Control Group	Differences	Std. Error	t-Statistic
Logsales	Unmatched	19.96	18.34	1.62***	0.2602	6.23
	ATT	19.96	18.88	1.08***	0.414	2.62

Note: ***, **, and * indicate significance at the 1%, 5%, and 10% levels respectively.

Firm age has a statistically significant positive effect on the dependent variable (e.g., sales, profitability, or another outcome). For every one-unit increase in the firm's age, the dependent variable is expected to have a positive impact. Since the p-value is less than 0.05, this result is statistically significant. Having a website has a positive effect on the dependent variable. Firms that have a website show a positive outcome on average. This is statistically significant at the 1% level. Treated Sample Mean: 19.6801776, Control Sample Mean: 18.3132997, Difference: 1.36687787, Standard Error: 0.265631024, T-statistic: 6.23. There is a statistically significant difference (1.37) in the outcome variable (likely log-transformed sales) between the treated and control groups. The t-statistic (6.23) is high, suggesting that the difference is significant at a very high level (much smaller than a 0.05 significance threshold).

Treated Sample Mean: 19.6761085, Control Sample Mean: 18.5220144, Difference: 0.154094126, Standard Error: 0.414669326, T-statistic: 2.62. The treated group has a higher average outcome (19.68) compared to the control group (18.52). The mean difference is approximately 1.15 units, suggesting the treatment had a positive effect. The standard error of 0.4147 reflects the variability or uncertainty around the estimate of the mean difference. A smaller SE indicates more precise estimation, and here it seems reasonably small. This value measures how many standard errors the observed difference is away from 0 (i.e., no effect). A t-statistic of 2.62 is typically considered statistically significant, especially at the 5% level ($\alpha = 0.05$), and in many cases even at 1% ($\alpha = 0.01$).

Since 2.62 > 2.58, the result is statistically significant at the 1% level. We can reject the null hypothesis that there is no difference between groups. These results provide robust evidence that the presence of Female Managers, substantially enhances firm sales, supporting the hypothesis that the intervention yields meaningful productivity gains.

Results-Model No 3

Table No 10 below gives the results of model No 3. In this model the variables are taken as: Treatment Variable**:** Female workers (both production and non-production)-Outcome Variable: log of sales-Confounding variables: Firm Age, Firm Size, Firm location, Firm Sector, Firm Sole Ownership, Firm Website

Table 10
PSM Result of Model No 3

Model 1 Female Owned	**Coefficient**	**z**	**p>absolute z**
Firm Age (FA)	.003	1.09	0.76
Firm Size (FS)	.629	6.13	0.000
Firm Location (FL)	.346	2.60	0.009
Firm Sector (FSect)	-0.09	-0.06	0.951
Firm's Sole ownership (FOwn)	-.4022	-4.23	0.000
Website/Social Media Presence(FWeb)	.6100	6.03	0.000
No of Obs	847		
LR chi2(6)	149.10		
Prob > chi2	0.0000		
Psuedo R2	0.1336		

The table No 11 given below shows the average treatment effect on the treated (ATT), it applies only to the female-owned firms, not all firms. It reflects that after controlling for cofounding factors, female-owned firms have on average higher or lower sales as compared to what they would have had if they were not female-owned. The table also shows if this effect is statistically significant or not.

Table 11
The ATT

Variable	**Sample**	**Treated Group**	**Control Group**	**Differences**	**Std. Error**	**t-Statistic**
logsales	Unmatched	19.84	18.18	1.66***	0.108	15.26
	ATT	19.81	18.93	0.878***	0.180	4.86

Note: ***, **, and * indicate significance at the 1%, 5%, and 10% levels respectively.

The effect of firm size is positive, but not statistically significant (p-value = 0.139 > 0.05). This suggests that the size of the firm does not have a significant impact on the dependent variable in this model. The effect of sole ownership on the dependent variable is statistically significant, suggesting that if a firm is solely owned it has a positive impact on the outcome variable. Having a website has a positive and statistically significant impact on the dependent variable (e.g., sales). Firms with websites see an increase in the outcome variable. The p-value is very small (0.000), indicating that the presence of a website is a strong predictor of the outcome.

The unmatched treated group had an average log of sales of 19.84, while the unmatched control group had an average of 18.18. The difference between them is 1.66, which is statistically significant t-statistic = 15.26, which is very high, confirming strong statistical significance. However, this difference may be biased because the two groups were not matched (i.e., not balanced on observable characteristics). After applying propensity score matching (PSM) or another matching method to control for observable differences: Treated group's average logsales = 19.81, Matched control group's logsales = 18.93, The difference (ATT) is 0.878, still statistically significant, t-statistic = 4.86 > 1.96 ⇒ significant

at the 1% level. Standard Error = 0.180 indicates moderate precision. These results provide robust evidence that the presence of Female workers, substantially enhances firm sales, supporting the hypothesis that the intervention yields meaningful productivity gains.

Conclusion

This study analyzed the influence of gender diversity on corporate performance within Pakistan's manufacturing and services sectors, concentrating on three aspects of female involvement: female ownership, female executive leadership, and female labor participation. The research employed a rigorous empirical method Propensity Score Matching (PSM) to account for firm-level attributes including age, size, location, sector, ownership type, and digital presence, therefore isolating the impact of gender participation on performance, quantified via the logarithm of sales.

In all three models, the findings consistently indicate that enterprises with female participation surpass their non-diverse equivalents. Female-owned enterprises were identified as older, larger in scale, less frequently sole proprietorships, and considerably more inclined to sustain a digital presence through websites. These structural advantages correlated with markedly enhanced governance efficiency and organizational effectiveness. Likewise, companies led by female managers had greater average age, increased size, and significantly higher rates of web adoption suggesting a correlation between leadership and operational maturity.

Model 3 indicated that companies with female employees were older, larger, and predominantly situated in the manufacturing sector. They had an elevated level of formal organization and digital interaction. The presence of female employees was thus linked to enhanced institutionalization, professionalization, and transparency qualities directly related to superior organizational performance.

The beneficial effect of female engagement was consistently significant across all three models, even after aligning treatment and control groups based on essential firm-level factors. This substantiates the assertion that gender diversity is not merely a question of social inclusion but a tangible catalyst for business performance.

Recommendations

This analysis yields various proposals for firm-level and institutional policies. Companies should be encouraged to incorporate women into ownership and executive leadership positions. The data unequivocally indicates that female-led enterprises exhibit superior organization and attain enhanced performance, even when accounting for other firm-level variables. Given that female managers are predominantly found in larger, more established organizations, business support initiatives should also prioritize enhancing managerial capabilities for women in medium and small enterprises. This can be accomplished via leadership training, mentorship initiatives, and corporate governance seminars. Given the predominance of female workers in the manufacturing sector, policies aimed at industrial zones, particularly in textiles and light engineering, must incorporate gender-sensitive frameworks for workplace development, safety, and career advancement. Online presence was a persistent advantage in female-led and female-inclusive businesses. The government and company development organizations ought to provide technical assistance and digital onboarding services specifically designed for women entrepreneurs and managers to improve visibility and market access.

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