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Research on the Influence of Female Executives on Corporate Social Responsibility Performance in Infrastructure Construction

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ABSTRACT
This study takes construction companies undertaking infrastructure construction as the research object and selects listed Chinese construction companies in Shanghai and Shenzhen A-share from 2010 to 2020 as the research sample, F test and Hausman test are used to determine the fixed-effect model form of unbalanced panel data to further analyze the impact of changes in the number of female executives in construction companies on corporate social responsibility (CSR). The empirical results show that when the number of female executives in construction companies is less than five, it does not positively affect CSR performance, while when the infrastructure corporate executive team has six or more female executives, which indicates that when the number of female executives reaches a certain threshold, it significantly improves CSR performance. In conclusion, the research results of this study support the critical mass theory, and by exploring the number of female executives in the construction industry, the gender diversity of the executive team in the construction industry has a positive impact on CSR performance, which promotes gender balance is conducive to improving the quality of social responsibility.
Keywords: *Infrastructure construction corporate, corporate social responsibility, the number of female executives, the critical mass theory*

1. INTRODUCTION

Corporate Social Responsibility (CSR) combined with economic, legal, social, and ethical responsibilities is a comprehensive responsibility for stakeholders. Corporate obtains driving force for its long-term and health development by establishing positive internal relationships and external relationships [1]. The " male farming and female weaving" farming cultivation culture in China, which was formed thousands of years ago, has created a comfortable and settled life for people, so the Chinese "home" culture has further increased people's reliance on housing. As the national economic pillar of China's construction industry, it is an important material production sector that affects the country's livelihood. Known as “Infrastructure Giant”, it’s the right way to get internal driving force for sustainable development of the Chinese infrastructure construction industry to fulfill their social responsibility and pay more attention to social responsibility in regards to project quality, environmental resources, safe operation, and other aspects.
On account of the high staff turnover of the workplace in the infrastructure construction industry, the male has been always playing the leading role, and the proportion of females in all sections and occupations among the infrastructure construction industry is quite small [2]. A research study on the construction industry in Australia found that women face invisible barriers and also have fewer employment positions or work opportunities than men [3]. Over the past few decades, many countries have successively developed legislative and organizational policies aimed at promoting equal employment opportunities for women, as in London, where a pilot project on female participation in construction projects was implemented, largely addressing the underrepresentation of women in the construction industry and the drive to improve the status of women in the construction industry [4]. With the improvement of modern economic and social development and the continuous improvement of education, the construction industry has developed rapidly in automation, 3D printing, and advanced modular construction technology. Construction companies are no longer the arena of "muscle and strength", female executives gradually occupy a place in construction corporations, become an important part of the diversification of senior management from which they play a decisive role in modern corporate governance. Therefore, following some European countries such as Norway, France, and Spain, the United States California, Australia, the Netherlands, and other countries have successively joined to join the ranks of setting quotas for female directors. The implementation of quotas on boards of directors will undoubtedly rapidly increase the number of female executives, with more opportunities and capabilities for women to enter the construction industry [5]. Although there is still some controversy about the role of female

executives in influencing CSR performance. Based on gender differences, scholars from different perspectives of psychology and ethics believe that women are more compassionate and more socially oriented [6]. Therefore, female executives on the board are more socially focused than male executives, and when there are a sufficient number of female executives on the board, the decision-making of the whole directors will pay more attention to social responsibility [7].

This study hereby is based on the fact of the infrastructure construction industry of China and takes the listed A-share construction corporates in Shanghai and Shenzhen stock market of China between 2010-2020 as the object, to explore whether the increase of female executives in the infrastructure construction industry will form a critical mass group, further study the influence of the number of female executives on CSR, and provide new research perspective and enlightenment of countermeasure for the infrastructure construction corporates to fulfill their social responsibility.

2. RESEARCH HYPOTHESIS

Scholars have studied the relationship between female executives and CSR from the perspectives of Social Role Theory, Upper Echelons Theory. They concluded that women are more benevolent and empathetic than men and are more driven by pro-social emotions such as affection and compassion [8], so they act more by emotional instincts than rational calculations to make donations and participate in community activities [9]. Female executives tend to take action to meet social expectations and thus pay more attention to "soft" matters such as CSR than their male counterparts [10], as they are better able to understand the needs of stakeholders and thus help companies gain a competitive advantage in resources [11]. Kanter proposed the Critical Mass Theory, which holds that members of a certain gender member can influence the overall perception of attitudes if they reach a certain threshold in the team [12]. Fernandez also found that companies disclosed more CSR information and performed better when they had three or more female executives [13]. The development of the construction industry, the progress of industrial informatization, and the improvement of the professional skills of female executives have increased the number of female executives within the construction industry. In short, when sufficient numbers of female executives are given representation, they can exert their unique value to express their opinions and views as well as show a distinctly different decision-making tendency from that of men, thus promoting the assumption of social responsibility. For that, this study hereby proposes the hypothesis as below:

H1: The number of female executives in infrastructure construction corporate has a different influence on CSR.

3. RESEARCH DESIGN

3.1. Data Source and Sample Identification

This study takes the listed A-share construction companies in the Shanghai and Shenzhen stock market of China between 2010-2020 as the object of study. To improve reliability, accuracy, and preciseness of data, the original data herein are processed as below:

1) Eliminate corporates with ST and *ST;
2) Eliminate corporates with insufficient data of major variables. Through screening, the nonequilibrium panel data composed of 802 observed results were finally obtained. Data in this study including the information of executives and financial information all come from the CSMAR database. To eliminate the influence of the extreme value, the Winsorize method was used to reduce the tails of the major variables at the 1% and 99% quartiles.

3.2. Research Models and Variable Definitions

To verify H1, a model has been established as below:

$$CSR_{i,t} = \alpha_0 + \alpha_1 FEM_{i,t} + \sum \alpha_2 CONTROL + Year + \varepsilon_{i,t} \quad (1)$$

1) Dependent variable: CSR. This study hereby selected the social responsibility report on Hexun (hexun.com), and the proportion of social responsibility weight of infrastructure construction corporate was assigned as follows:

Construction CSR = 30% for stockholders +15% for employees +15% for suppliers, clients, and consumer rights and interests + 20% for environment + 20% for society.

2) Independent variable: number of female executives (FEM). Scholars have defined female executives in a broad definition and a narrow definition. The broad definition of female executives refers to female directors, supervisors, general managers, deputy general managers, chief financial officers, and all female members of the top management team, while the narrow definition of female executives refers only to female directors. In the construction industry, considering only female directors does not reflect the role of female executives in the whole executive team. In this paper, female executives have a broad meaning. The assignment method is used to measure female executives (FEM), female executives are assigned 1 and male executives are assigned 0. The total number of female executives in the enterprise represents the measurement index of FEM.

3) Control variables. The control variables selected for this study are corporate size (SIZE), corporate operating age (AGE), financial leverage (LEV), corporate profitability (ROA), corporate growth (GROWTH), and shareholding proportion of the largest shareholder (TSHARE).

3.3. Selection of Model Form

The panel data model forms mainly include the fixed-effect model, random-effect model, and mixed-effect model. For the selection of model form, this study first uses the F-test to determine the choice of fixed-effect model or mixed-effect model and then determines the use of fixed-effect or random-effect model according to the Hausman test. In this study, Stata16.0 was used for the subsequent tests. During F-test on Model (1) in this study, the F-statistic value is 5.52 and the p-value is 0.000. Hence, for Model (1), the fixed-effect model is superior to the mixed-effect model. Next, the Hausman test for Model (1) was conducted and the Hausman test statistic was 95.13 with the p-value of 0.000. For Model (1), the fixed-effect model was preferred over the random-effect model.
Therefore, combining the results of the F-test and Hausman test, the form of Model (1) established in this study was determined as a fixed-effect model and further controlled for the year.

4. EMPIRICAL RESULTS

4.1. Descriptive Statistics

Table 1 summarizes the descriptive statistics of the main variables. The results show that the average CSR of infrastructure construction corporate between 2010-2020 is 24.29, the maximum is 73.18 and the minimum is -1.640. On the whole, CSR of the listed infrastructure construction corporate in China is not satisfactory, and the differences in social responsibility among infrastructure construction corporates are still very obvious, so how to further improve CSR has become an urgent issue to be solved. The average FEM is 2.97, and the standard deviation is 1.92, which indicates that most companies only have 3 to 5 female executives, while a few companies have more female executives, and there is a certain gap in the number of female executives among companies. The number of female executives incorporated is quite different from each other. From Figure 1, it can be seen that the number and percentage of female executives in China's construction industry are increasing year on year during the period 2010-2020.

Table 1 Descriptive statistical analysis of major variables

Variables	*N*	*Mean*	*SD*	*Min*	**Max**
CSR	802	24.29	16.10	-1.640	73.18
FEM	802	2.970	1.920	0	10
AGE	802	2.780	0.480	1.100	3.500
SIZE	802	23.03	1.820	19.17	27.81
LEV	802	0.640	0.170	0.150	0.920
ROA	802	0.030	0.040	-0.170	0.130
GROWTH	802	0.170	0.260	-0.320	1.680
TSHARE	802	37.90	15.16	8.260	72.88

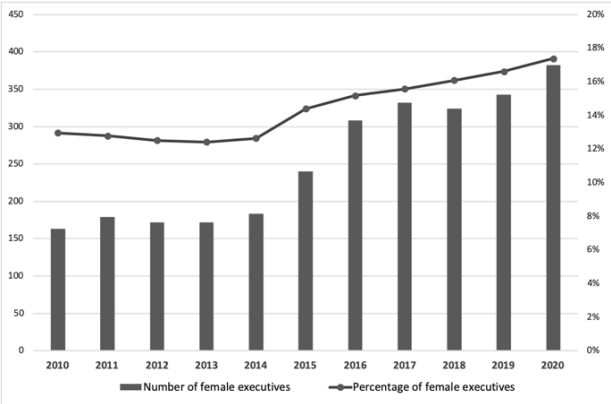

Figure 1 Female executive trends in the construction industry between 2010-2020

4.2. Correlation Analysis

The Pearson correlation coefficient matrix of the main variables of the model is shown in Table 2. The correlation coefficients between the main variables are small, so there will be no serious multicollinearity problem in regression analysis. It can be seen from the table that CSR has a significant negative correlation with FEM above 1%, but the influence of control variables is not considered yet. This paper will further use the fixed-effect model to explore the influence of FEM quantity change on CSR in the future. The correlation coefficients between the main variables are small, and there will be no serious problem of multiple cointegrations in the regression analysis. From the preliminary analysis results, the test model established in this paper is relatively effective.

Table 2 Correlation analysis of major variables

	CSR	*FEM*	*AGE*	*SIZE*	*LEV*	*ROA*	*GROWTH*	*TSHARE*
CSR	**1**							
FEM	**-0.162*** **	**1**						
AGE	**-0.298*** **	**0.235*** **	**1**					
SIZE	**0.298*** **	**-0.199*** **	**-0.321*** **	**1**				
LEV	**0.177*** **	**-0.137*** **	**-0.057**	**0.622*** **	**1**			
ROA	**0.354*** **	**-0.002**	**-0.153*** **	**-0.076** **	**-0.259*** **	**1**		
GROWTH	**0.092** **	**0.007**	**-0.105*** **	**-0.004**	**-0.003**	**0.370*** **	**1**	
TSHARE	**0.256*** **	**-0.160*** **	**-0.354*** **	**0.404*** **	**0.244*** **	**0.130*** **	**-0.017**	**1**

Note: t statistics in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

4.3. Regression Analysis

This study used the fixed-effect model to investigate the differential impact on CSR performance when the number of female executives in construction corporates is less than two, two-five, and more than six. The specific regression results are shown in Table 3. When the number of female executives in infrastructure construction corporates is less than two, it is an insignificant negative correlation with the influence at 5%, and having two-five female executives also does not improve CSR performance, which may be related to the gender discrimination and unfair treatment of female executives in the construction industry. However, when there are 6 or more female executives in the enterprise executive team, female executives have formed a critical mass and played a positive role in the CSR performance of the infrastructure construction corporate.

Table 3 Regression analysis of quantity of female executives in infrastructure construction corporate on CSR

	(1)	*(2)*	*(3)*
	Less than two	***Two-five***	***More than six***
FEM	-8.248**	-1.386**	11.993**
	(-2.49)	(-2.16)	(1.97)
Control variables	YES	YES	YES
Year	YES	YES	YES
Constant	39.046	-81.360**	-866.602**
	(0.51)	(-2.33)	(-2.49)
R^2	0.751	0.655	0.962
F	16.677***	19.171***	2.841***

Note: t statistics in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

5. CONCLUSION

This study takes the listed A-share construction companies in Shanghai and Shenzhen stock market of China between 2010-2020 which are incorporated in enterprise social responsibility evaluation by Hexun (hexun.com) as the object of study. It explores the influence of female executives on social responsibility performance in infrastructure construction corporate. Results indicate that the female executives with a certain critical mass(more than six)in the management team will have a positive influence on CSR and improve the performance quality of CSR. It has significant enlightenments for the infrastructure construction corporates to improve their CSR performance, increase gender diversity in teams, and promote gender equality within the industry. In the construction industry, the scale of female executives in the executive team should be appropriately expanded to produce its group superposition effect, which can strongly promote the quality of corporate social responsibility. In addition, based on the internal construction of the social responsibility management system, improve the awareness and ability of all employees to practice social responsibility, and integrate the social responsibility strategy into the long-term management of the corporation in a well-planned way. As a member of a multi-organizational society, construction corporations form a social responsibility promotion path based on “horizontal integration into business operations and vertical extension of internal corporate management”. Thereby, the social responsibility performance can be executed during development, while development can be maintained during the execution of responsibility, organically unifying social responsibility with economic interests.

The study of this paper has certain limitations. The sample of this paper is limited to listed construction corporations in China that have disclosed their CSR reports and are rated by Hexun. So, there is a certain deviation in the sample selection, and more information within the corporates cannot be obtained, it is difficult to accurately know the views and performance of female executives on CSR-related issues in the corporate. Therefore, in future research, we will consider the application of the questionnaire method and case study method to deeply analyze the different views of female executives and male executives on corporate social responsibility, excavate the internal problems and laws

through phenomena, and promote the diversification of research methods.

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