

Research on the Substantial Impact of Women Executives on the Third-Party Engineering Quality Inspection and Testing Institutions

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Abstract: As The Times advance and women have more opportunities in the workplace, research shows that women come with many advantages: strong financial skills, sensitive thinking, reasonable resilience and high levels of trust. Compared with men of the same age, women tend to have a more mature concept of financial management and investment. Female managers are more likely to seize business opportunities, have a comprehensive and careful thinking of people and things, and can make reasonable use of their existing wealth and ability. And in the credit system construction is not sound environment, high credit is more precious. And the third party testing institutions is the most basic rules: fair, notarization and integrity of the three substantive requirements, this article through women's material impact for third party testing agencies, to further explore women for management ability for such institutions substantial role, strategy development, benefit, and summarize analyze material, at the same time extended to the construction agency industry, leading the substantive work of women's participation in engineering industry, "half the sky" economy.

1. Introduction

The third-party engineering quality inspection is a special part of the engineering quality supervision industry. As one of the supervision means to ensure the quality of various engineering, it has been paid more and more attention with the improvement of people's quality awareness. With the continuous deepening of China's economic system reform and the gradual improvement of the market economic system, third-party engineering quality testing institutions have entered into the competition mechanism and walked on the road of market-oriented, socialized and specialized intermediary supervision service nature [1-3]. Current third party engineering test market gradually open, testing agencies increasingly fierce competition, how to ensure that the third party engineering quality test institutions do behavior standardization, standardization, to ensure the justice of testing data, scientific, effective, authority, from the test required people, machine,

material, method, ring and so on each link, inspection management system, etc., discusses construction and operation of women how to effectively manage these resources, will affect the test result of various factors to conduct a comprehensive control system, The whole process of testing and other aspects involved are taken as an organic whole to effectively control the factors affecting the quality of testing and their interrelations, so as to meet the social requirements for the quality of testing data and results. Strive to keep improving, help the third party engineering quality inspection institutions in the process of transformation to find their own positioning, change their thinking, improve their core competitiveness, and strive to become the “leader” in the fierce market competition.

2. Research on Substantive Impact

2.1 Theoretical Analysis of the Substantial Influence of Management Ability

According to statistics from third-party engineering quality inspection and testing institutions still open by the China Market Supervision Administration in 2019, Female general Manager account for 42.7 percent of the third-party engineering testing industry, nearly half, legal representative or supervisor. And nearly 82.2% of them have been registered and operated for more than 6 years, with no related bad records. In addition, 67.8% of the institutions with female general managers reached grade A or above of “honoring contracts and honoring credit”, and 64.2% of the third-party engineering testing institutions with female general managers had A turnover of more than 100 million yuan [4].

From the above data, it is not difficult to see that women have a certain advantage in terms of management power. Compared with male managers, female managers have a natural affinity and pay more attention to the feelings of employees in their management work. Female managers have better communication skills. They can clearly express their intentions and work goals, and have good communication with subordinates. They don't feel lonely. In addition, female managers are better at motivating all employees and fully mobilizing their potential in their work.

Female managers emphasize relationship harmony more than men do. In the field of management, men are used to giving orders, while women pay more attention to care and trust, communication and motivation, and emphasize the active participation and cooperation of the team [5]. Women managers also have other advantages, such as being good listeners, flexible and resilient, and being more cautious in their decisions.

The above advantages of female managers make them pay more attention to the coordination and balance of interpersonal relationship in management and collaborative work. They make clear decisions, understand people and work in a human way, which form a unique female leadership style and leadership skills.

The survey data of China Entrepreneurs Association in 2019 has been widely cited: among the managers of such institutions or companies, the male ratio is 57.9% and the female ratio is 42.1%, which is basically unchanged. But at the general manager level, the figure is as high as 83.4 percent for men and 16.6 percent for women.

In the zhejiang province through the third-party engineering quality inspection and testing machine association released by the data research, Zhejiang Province, such institutions or companies a total of 576.As many as 62.3% are women in managerial positions, while only 37.7% are men.71.5% more women held quality control positions [6]. However, women hold only 35.8 percent of technical leadership positions.

The general manager is the top manager of the engineering quality inspection and testing institution, and the person in charge of quality is the person in charge of the management and operation of the overall quality system of such institution or company. The top manager is fully

responsible for the operation and management of the organization. During the absence of the top manager, the person in charge of quality shall exercise the power on his/her behalf. The person in charge of quality shall be responsible for the operation and management of the company's overall quality system. Whether the company can continue to operate effectively mainly depends on the management and cooperation of the general manager and the person in charge of quality. Combined with the characteristics of the third engineering quality testing organization, actually this kind of organization is referred to in the laboratory before everybody, work environment, work process requires careful and strict management process requires comprehensive, so more in line with the women managers to reflect their leadership, more embodies the women also the advantages of fine work in the laboratory [7].

Hypothesis 1: Female substantive management has a positive impact on third-party engineering quality inspection and testing institutions, but there are differences among different institutions.

2.2 Research on the Substantial Impact of Economic Benefits

According to the survey data, the number of female founders of such companies has reached 42.7 percent. And the economic benefit of the third party inspection and testing institutions or companies is also inseparable from the founders' substantial contribution to the economic benefit. This paper takes entrepreneurial women in the service industry of third-party engineering inspection and testing institutions in Zhejiang Province as the research object to study the substantial impact of women on the economic benefits of third-party inspection and testing institutions.

A third-party inspection and testing institution (commonly known as a full-time supervision and inspection institution) shall conduct commodity inspection and testing activities in accordance with relevant laws, standards or contracts as an impartial and authoritative non-party.

The existence of independent third-party testing enterprises has its own special significance, which is not only an effective supplement to government regulation, help the government get rid of the "crisis of confidence", but also can provide support for industrial transformation and upgrading, and provide a powerful service platform for industrial development. With the improvement of people's living standards and the aggravation of international trade barriers, China's third-party testing industry has developed rapidly. At the same time, our country has carried out market-oriented full-time supervision and inspection institutions competition mechanism. From the survey of women as a founder, as a department head or economic benefits brought by the finance director can be from two aspects to research, women consider thoughtful exquisite, undertake business (clients) have patience, multifarious business model is suitable for testing institutions, women also have strong characteristics, control is strong and has specificity to the target material, cost control, resource utilization, in such a company business to undertake both has a unique advantage.

Hypothesis 2: The grasp of women's substantial economic benefits has a positive impact on the third-party engineering quality inspection and testing institutions, but there will be differences among institutions of different nature.

2.3 Research on the Substantial Impact of Innovation Input

Regional environment is one of the important external conditions affecting the behavior of enterprises, specific to the regional economic development level of female executives and corporate innovation relations, the influence of both can be viewed from two dimensions to understand: one is that the higher the level of regional economic development, enterprise facing the regional environment, the more perfect, the rich resources, conditions and resources required for companies to innovate more perfect. For example, the information technology of the institution is relatively

developed, which can promote the production, dissemination and feedback of knowledge and information, thus improving the technological innovation ability of the inspection and testing institution in the region. With a good institutional environment, it can guide and encourage institutions to actively carry out innovative activities, so that institutions can make full and effective use of regional economic resources; With more high-quality talents, it can provide the source and strength for enterprises to carry out innovation activities. High-quality talents are the key factor for institutions to carry out innovation and the direct implementer of innovation activities, which directly determines the input and output of innovation activities (Zu Xuewei & Yi Zongcheng,2020).Second, the higher the level of regional economic development, the more opportunities women have to have access to various resources, such as educational resources, economic participation, employment and political participation (Shi Ke & Zhang Na,2011).The more developed the regional economy, the more likely women are to have the human capital needed for management positions, and the more likely companies are to need women's unique knowledge, experience and values. Less developed areas in economy, conservative and is strongly influenced by Chinese traditional thought of “roles”, women are still more family responsibilities rather than the social and economic responsibility, leading to low female human capital stock is indisputable facts (Qi Yimeng.2020), which has restricted the female executives to the enterprise decision-making participation, is unfavorable to the company the development of innovative activities.

Hypothesis 3: The regional economic development level regulates the relationship between female executives and the company's innovation investment. The higher the regional economic development level is, the greater the influence of female executives on the company's innovation investment will be.

3. Model Specification

Taking the third-party engineering quality inspection and testing institutions and companies in Zhejiang province from 2016 to 2019 as samples, relevant data, statistical data and basic information data of female executives of institutions were downloaded from the database of Market Supervision Administration of Zhejiang Province, and the original materials such as female executives were manually sorted out. This article has not obtained by CMA (certificate of testing institutions aptitude) of enterprises or institutions, non-engineering testing agencies, there exists abnormal conduct engineering inspection inspection agencies, has not obtained CMA certificate organization representative does not actually run it makes little sense to research, non-engineering class testing institutions is not fall within the scope of this article studies the main reason, there are abnormal operation behavior problems may interrupt business or business impact on the structure of the study in the biased, so as to eliminate. Finally, 2416 valid sample observations were obtained from the published data of 576 institutions from 2016 to 2019.All samples were classified into two groups, PanelA and PanelB, according to institutions (including universities and engineering inspection and testing institutions within scientific research institutes) and enterprises (state-owned enterprises, private enterprises, foreign-funded enterprises and others). This paper uses stata2.0 to complete some relevant empirical work.

3.1 Variable Design and Definition

3.1.1 Explained Variable

The explained variable is the material effect, and this paper chooses the total asset return on accounting income (ROA) as the proxy variable of the institutional benefit. The calculation formula is as follows:

ROA=Net profit/total assets

3.1.2 Explanatory Variable

FEMA, which is mainly used to calculate Female executives, mainly includes three variables: virtual variable Female (if Female executives are considered to have an impact on organizational management, Female=1; otherwise, it is 0). FEnum (number of women in management); FEpercent (number of female managers/total number of managers). These three types of variables are used to compare the degree of female management participation in an organization. The number of female managers as finance or business managers, as measured by the total number of female business or finance managers, expressed as FMSaleFan. FMGema represents the dummy variable of whether the organization is a female general manager [8]. If the general manager is female, FMGema=1; otherwise, FMGema=0. InFdir is the number of female department heads in an organization, and NinFdir is the number of female managers who are not directors in an organization.

3.1.3 Control Variable

Several variables are specially set, which have the following meanings:

TOTALassets: Represents the total assets at the end of the period;

SCALEAlassets: Denotes that the natural logarithm is used as a variable to measure the size of the enterprise;

TOTALNum: Represents the total number of management personnel;

PROFITGrowth: Represents the company's net profit growth rate (measures the company's growth);

WORKKCapital: Represents working capital (a measure of a company's operations);

LEVasset-liability ratio: Represents the asset-liability ratio (total debt/total assets at the end of the period);

CERTIYears: Represents the time when the certificate was obtained (the first time until this year);

DUAlity: Is the chairman and general manager, yes is equal to 1, otherwise is 0;

INDvariable: Virtual variables, say industry involved eight professional (witness sampling test, detection, steel structure, curtain wall structure detection, municipal bridge, foundation detection, air quality, building intelligent detection), therefore, set up eight professional virtual variable Z1 ~ Z8, when they belong to the Z1 ~ Z8 take 1 when one of the industry, other virtual variable 0. YEAR is the dummy variable of the YEAR. This study involves three years from 2016 to 2019, so three dummy variables of Y1 to Y3 are set.

3.2 Model Design

In order to test the substantial influence of women on third-party engineering quality inspection and testing institutions, the model is constructed as follows:

(1) In Model 1, the variable FEMA to test Female executives includes the dummy variable Female, the assigned variable FEnum and the proportional variable FEpercent. The three variables are respectively substituted into this model for empirical verification, which can confirm the impact of women's substantive management ability on the third-party engineering quality inspection and testing institutions:

$$\begin{aligned} \text{ROA} = & \alpha + \beta_1 \text{FEMA} + \beta_2 \text{TOTALasset s} + \beta_3 \text{TOTALNum} + \beta_4 \text{PROFITGrowth} + \\ & \beta_5 \text{WORKKCapital} + \beta_6 \text{LEVasset - liabilityratio} + \beta_7 \text{CERTIYears} + \beta_8 \text{DUAlity} \\ & + \lambda_1 \text{INDvariable} + \lambda_2 \text{YEAR} + \varepsilon \end{aligned}$$

(2) In Model 2, the number of female executives serving as financial or business managers is replaced by the number of female executives. Three variables are also substituted into this model for empirical verification, which can confirm the impact of women's grasp of substantial economic benefits on third-party engineering quality inspection and testing institutions:

$$ROA = \alpha + \beta_1 FMSaleFan + \beta_2 TOTALassets + \beta_3 TOTALNum + \beta_4 PROFITGrowth + \beta_5 WORKCapital + \beta_6 LEVasset-liabilityratio + \beta_7 CERTIYears + \beta_8 DUALity + \lambda_1 INDvariable + \lambda_2 YEAR + \varepsilon$$

(3) In Model 3, it is tested whether a female head of general manager can bring substantial impact on institutional innovation. Therefore, FMGema is replaced in model 3 to verify the relationship between female executives and the company's innovation investment. The higher the regional economic development level is, the greater the impact of female executives on the company's innovation investment will be:

$$ROA = \alpha + \beta_1 FMGema + \beta_2 TOTALassets + \beta_3 TOTALNum + \beta_4 PROFITGrowth + \beta_5 WORKCapital + \beta_6 LEVasset-liabilityratio + \beta_7 CERTIYears + \beta_8 DUALity + \lambda_1 INDvariable + \lambda_2 YEAR + \varepsilon$$

Third-party inspection and testing institutions are divided into public institutions and non-public institutions. Public institutions generally carry out inspection and testing work on behalf of government institutions with small revenue goals, mainly focusing on scientific research goals. Rather than most of the market behavior, for the purpose of management, combining with management, economic benefits of the control forces, innovation more can reflect the significance of the study, according to the following Table 1 descriptive statistical results show that the institution of female executives participation than institutions is weak, but the regression results show that the role of women in the business unit is more significant, which further illustrates the executive role play with the attributes of the unit is inseparable.

Table 1: Female Executives and Management

Female executives and management						
Variable	Public institution			Non-public Institution		
	Virtual	Assignment	Proportion	Virtual	Assignment	Proportion
Female	0.056*			-0.005		
	(1.68)			(-0.12)		
FEnum		0.033*			-0.008	
		(1.81)			(-0.44)	
FEpercent			0.418**			-0.052
			(2.21)			(-0.35)
TOTALassets	-0.052**	-0.047**	-0.047*	0.020	0.019	0.017
	(-2.10)	(-1.96)	(-1.94)	(0.89)	(0.85)	(0.82)
TOTALNum	-0.006	-0.007	-0.005	0.008	0.010	0.007
	(-0.81)	(-1.11)	(-0.60)	(1.29)	(1.36)	(1.26)
PROFITGrowth	0.011	0.013	0.012	-0.005	-0.005	-0.004
	(1.02)	(1.05)	(1.06)	(-0.15)	(-0.14)	(-0.14)
WORKCapital	0.000	0.000	0.000	0.000	0.000	0.000
	(0.30)	(0.25)	(0.27)	(0.06)	(0.06)	(0.06)
LEVasset-liabilityratio	0.218**	0.214**	0.212**	-0.062	-0.063	-0.060
	(2.39)	(2.34)	(2.33)	(-0.75)	(-0.72)	(-0.73)
CERTIYears	-0.004	-0.007	-0.010	-0.001	-0.002	-0.002
	(-0.02)	(-0.02)	(-0.03)	(-0.17)	(-0.12)	(-0.12)
DUALity	0.035	0.033	0.033	-0.003	-0.004	-0.004
	(0.72)	(0.71)	(0.69)	(-0.10)	(-0.10)	(-0.12)
YEAR/IND	Control	Control	Control	Control	Control	Control
C	0.187	0.251	0.235	-0.067	-0.070	-0.063
	(0.02)	(0.04)	(0.04)	(-0.68)	(-0.68)	(-0.61)
N	1327	1327	1327	1089	1089	1089
R-sq	0.0072	0.0072	0.0079	0.0066	0.0066	0.0066
F	1.478	1.489	1.629	0.700	0.711	0.708

Note: *, **, and *** represent significant at the level of 10%, 5%, and 1% respectively; The value in parentheses is 1.

The regression results of model 2 and model 3 are listed in Table 2. The results show that the number of female senior executives serving as financial or business managers in PanelA is significantly positively correlated with ROA at the level of 10%, indicating that the higher the number of female business managers and financial managers in a public institution, the more substantial the impact will be on the economic benefits of the institution. In PanelB, there is no significant correlation between the number of female executives serving as financial or business managers and the economic efficiency of the institution, that is, the influence of female executives in non-public institutions on the economic efficiency of the institution has nothing to do with the number of female executives serving as financial or business managers in the institution. For Model 3, we conducted an analysis test: whether a woman becomes the top manager (top manager) has no significant positive correlation between PanelA and PanelB. Because whether a man or a woman holds the top position in the third inspection and testing institution has little impact on innovation investment. However, after distinguishing the factors of regional economic level, it is found that regional economic level is positively correlated with the innovation input of female executives.

Table 2: The Number of Female Executives (as Finance or Business Managers), Regional Economic Level, Economic Benefits and Innovation Input

The number of female executives (as finance or business managers), regional economic level, economic benefits and innovation input				
Variable	Model 2		Model 3	
	PanelA	PanelB	PanelA	PanelB
FMSaleFan	0.003*	-0.000		
	(1.68)	(-0.12)		
FMGema		0.033	-0.048	-0.012
		(1.81)	(1.92)	(-0.54)
TOTALassets	-0.051**	0.020	-0.052*	0.019
	(-2.11)	(0.91)	(-2.08)	(0.84)
TOTALNum	-0.004	-0.007	-0.004	0.008
	(-0.81)	(-1.24)	(-0.57)	(1.34)
PROFITGrowth	0.013	-0.008	0.015	-0.003
	(1.00)	(-0.14)	(1.05)	(-0.12)
WORKCapital	0.000	0.000	0.000	0.000
	(0.31)	(0.07)	(0.31)	(0.05)
LEVasset-liability ratio	0.216**	-0.063	-0.214**	-0.062
	(2.38)	(-0.74)	(2.33)	(-0.73)
CERTIYears	-0.006	-0.002	0.022	-0.002
	(-0.01)	(-0.16)	(0.03)	(-0.11)
DUALity	0.036	-0.004	0.032	-0.002
	(0.73)	(-0.12)	(0.65)	(-0.11)
YEAR/IND	Control	Control	Control	Control
C	0.241	-0.064	-0.130	-0.073
	(0.04)	(-0.65)	(-0.03)	(-0.71)
N	1327	1089	1327	1089
R-sq	0.0070	0.0065	0.0062	0.0065
F	1.470	0.712	1.253	0.679

3.3 Robustness Test

The robustness test is carried out with the data of three years from 2016 to 2019. In addition, in terms of the requirements for sample distribution, the PERCENTAGE of female executives in

BLAU index FEpercent is higher (Zhu Xuewei & Yin Zongcheng, 2020). Its calculation method is: $1 - \text{fepercent}^2 - (1 - \text{fepercent})^2$. The test results shown in Model 1, Model 2, and Model 3 are in full compliance with the above assumptions as shown in Table 3.

Table 3: Robustness Test

Robustness test						
Variable	Model 1		Model 2		Model 3	
	PanelA	PanelB	PanelA	PanelB	PanelA	PanelB
BLAU	0.426	-0.052				
	(2.71)	(-0.35)				
FMSaleFan			0.004	-0.002		
			(-0.13)	(-0.02)		
SCALEAssets					-0.017	-0.009
					(-0.11)	(-0.10)
TOTALAssets	-0.073**	0.078	-0.075	0.079	0.117	0.085
	(-2.50)	(3.22)	(-2.60)	(3.28)	(3.30)	(4.01)
TOTALNum	-0.008	0.013	-0.012	0.013	0.020	0.024
	(-1.38)	(1.56)	(-1.60)	(1.52)	(1.57)	(2.44)
PROFITGrowth	0.012	0.004	0.014	0.004	-0.002	0.036
	(1.02)	(0.007)	(1.02)	(0.08)	(-0.03)	(0.64)
WORKCapital	0.000	-0.002	0.000	-0.001	-0.001	-0.001
	(0.21)	(-0.62)	(0.30)	(-0.61)	(0.75)	(-1.33)
LEVasset-liability ratio	0.343	-0.051	0.346	-0.055	-0.080	-0.019
	(3.08)	(-0.52)	(3.12)	(-0.52)	(-0.42)	(-0.15)
CERTIYears	-0.052	-0.024	-0.046	-0.022	0.502	-0.015
	(-0.08)	(-2.81)	(-0.07)	(-2.84)	(0.31)	(-2.85)
DUALity	0.068	-0.004	0.072	0.004	-0.062	0.011
	(1.16)	(-0.13)	(1.18)	(0.15)	(-0.95)	(0.33)
YEAR/IND	Control	Control	Control	Control	Control	Control
C	0.985	0.009	0.885	0.002	-7.369	-0.268
	(0.10)	(0.08)	(0.08)	(0.01)	(-0.35)	(-2.26)
N	1327	1089	1327	1089	1327	1089
R-sq	0.0143	0.0182	0.0128	0.0177	0.0305	0.0952
F	2.558	1.688	2.308	1.677	1.869	3.240

4. Research Conclusions and Inspirations

Although there are a lot of relevant studies on female entrepreneurs at home and abroad, the industry, culture, region and the formation path of senior executives are different from that of engineering industry, so these studies cannot be copied and applied in this paper. Therefore, using the data of the third engineering quality inspection and testing institution in the field familiar to the author, this paper empirically analyzes the influence of female senior executives' management ability, their ability to control enterprises' economic benefits and their investment in innovation ability in the case of two different institutions, public institutions and non-public institutions. The following conclusions can be drawn from the study: the management ability of female senior executives is related to the nature of the institution in which they are located, and the environment of public institutions is more suitable for the conservative style of female executives. Female senior executives can give full play to their unique management ability, while female senior executives of public institutions cannot effectively give play to their management ability in this respect.

As in the 1950 s, American female justices Ruth Bader Ginsburg put forward the concept of equality between men and women, this concept has attracted great attention in the west after, to this day in our country also early in the eighteenth big report clearly will be included in the national

policy of gender equality, so today I want to whether it is a business entity or institution, we should pay more attention to women in the engineering field, especially the engineering quality in the third inspection inspection agencies (experimentation) homework. It advocates giving women the opportunity to show themselves and the right to manage, and strives for more opportunities for female managers to promote themselves and show their talents in more industries, so as to bring more excellent roles and influences to institutions or countries.

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